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ABSTRACT

A feasibility study was conducted on the consolidation of the data processing centers for three school districts, a community college district, and a county office of education in response to legislation passed by the California State Senate in 1973. The consultants reviewed existing operations of each district, determined data processing needs, and stipulated goals for each data processing center. Long-range data processing needs were considered in the context of existing capabilities, and six alternative consolidation plans were developed. The consultants concluded that it would not be feasible, advantageous, or result in immediate cost saving to use the existing computer hardware as a basis for a consolidated data processing center. However, they did recommend consolidation as both economically and technically feasible within five years. (DGC)

ED102941

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Report To
ELECTRONIC DATA PROCESSING
STEERING COMMITTEE
On The
FEASIBILITY OF DATA PROCESSING
CENTER CONSOLIDATION

U.S. DEPARTMENT OF HEALTH,
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IR 001 616

PEAT, MARWICK, MITCHELL & CO.
555 CAPITOL MALL
SACRAMENTO, CALIFORNIA 95814

December 3, 1974

Mr. William Rutland, Chairman
Electronic Data Processing Steering Committee
c/o Superintendent of Schools
Sacramento County Office of Education
6011 Folsom Boulevard
Sacramento, California 95819

Dear Mr. Rutland:

Peat, Marwick, Mitchell & Co. has completed its study to determine the feasibility of consolidating the data processing centers of the following agencies:

- Grant Joint Union High School District
- Los Rios Community College District
- Sacramento City Unified School District
- Sacramento County Office of Education
- San Juan Unified School District.

The enclosed report documents the study's findings, analysis and conclusion. To assist reading of the report, an executive summary of the entire report is presented in Section I.

* * * * * * *

We wish to express our appreciation to the agencies' management and staff for the excellent cooperation extended to us during the course of the study.

Very truly yours,

Peat, Marwick, Mitchell & Co.

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I – EXECUTIVE SUMMARY

This section contains an overview of the entire report.

OBJECTIVES OF STUDY

The objective of this study, as stated in Senate Bill 804, is to determine the feasibility of consolidating the electronic data processing centers of four school districts and the Office of the County Superintendent of Schools. Section 3, SB 804 states:

> "The consulting firm selected to report shall respond to the following:
>
> (a) Identification of similarities and differences of policies and goals of the existing district and county superintendent of schools operations.
>
> (b) Identification of similarities and differences in operations and services of the data processing centers.
>
> (c) In the areas of education, administration and business, determine the long-range goals for electronic data processing.
>
> (d) Provide an analysis of various alternatives in the field of data processing to achieve the goals reported in subdivision (c) of this section."

APPROACH

We have followed the detailed work plan as outlined in our proposal to the Electronic Data Processing Steering Committee dated January 1974. Three and one-half months were devoted to fact-finding to gain information identifying: similarities and differences of the educational philosophies, policies, priorities and goals of the five agencies; operations and services of each data processing center; and each agency's long-range data processing goals.

During the course of our fact-finding, we visited over 35 different sites. We attended Board of Education meetings at each of the five agencies. Interviews were held with over 225 people, including board members, superintendents, assistant superintendents, college presidents, deans, principals, vice principals, counselors, research directors, administrative department heads and staffs, registrars, teachers, and data processing staffs.

On a regular basis we met with the technical and advisory committees, have discussed our progress to date, as well as supplying preliminary draft material for comment and clarification.

POLICIES AND GOALS OF EACH AGENCY

The high-level goals of each agency are very similar: Provide the best possible education and maintain fiscal responsibility. However, the policies of each agency tend to differ due to the size of the population served and the type of services provided (e.g., the County Superintendent of Schools provides only special services, Grant serves only junior and senior high schools, Sacramento City Unified and San Juan Unified serve grades K-12, and Los Rios serves a junior college population). The very nature of the diversity in size of student population (10,000 to 70,000) and services provides a logical base for different policies being required to meet different problems. However, the type of information necessary to make those policy decisions is common to all agencies.

OPERATIONS AND SERVICES OF THE DATA PROCESSING CENTERS

There is considerable diversity in the resources, staffs, and services offered by each agency's data center. With the exception of Sacramento City Unified and Los Rios, all the agencies have different and therefore incompatible computers. This precludes the simple sharing of common application programs without considerable reprogramming. Data processing staffs range from almost four full-time employees at Grant to over twenty at Sacramento City Unified and Sacramento County Regional Center. Services offered range from almost exclusively business at Grant to almost exclusively pupil personnel at the County Regional Center. These differences exist as a result of available resources and priority setting within each agency. However, the need for a full range of services exists at all agencies.

LONG-RANGE DATA PROCESSING GOALS

In late August and early September of 1974, we held long-range data processing planning sessions at each agency. We requested the participation of the Superintendent, Director of Data Processing, and Assistant Superintendents of Business and Instruction. The results of those planning sessions were prioritized lists of goals and the approximate cost over the next five years for the implementation of the long-range plans. Figures used by each agency as its estimate of cost five years from now were used for the baseline of comparison (Alternative No. 1).

The goals showed a common need for better, more timely access to information through a data base approach. Such areas as budget, student records, attendance, guidance and career exploration, and personnel data bases ranked high on the lists.

ASSUMPTIONS

In the development of approaches to consolidation, we developed the following assumptions:

- Consolidation alternatives must result in no degradation of service.
- Consolidation alternatives must be both technically and economically feasible.
- Consolidation alternatives must allow for future needs.
- Where possible, software packages (vendor supplied, commercially marketed, or existing systems) will be substituted for custom software development.
- As most of the agencies are contemplating additional hardware and/or personnel to satisfy unmet needs, the economic profile as it would exist in 1979 is used as a baseline.
- Certain functions will remain as agency responsibilties (e.g., data entry, educational consultants, data processing coordinators).
- Hardware cost estimates are based on the average of prices supplied by five vendors.
- Hardware cost estimates are based on one-year lease cost, although final arrangement may be long-term lease or purchase.
- Personnel costs are based on five percent annual inflation and include all fringe benefits.
- Capability for on-line systems is included in all consolidated hardware alternatives.

DEVELOPMENT OF ALTERNATIVES

We originally considered over 30 different alternatives for consolidation before narrowing the list to its present size. Economic and technical feasibility tests were applied to each alternative. We visited many data centers (including the Teale Data Center) to validate many of our assumptions. After much consideration, we finally agreed on the following list of alternatives which were presented at the September 5, 1974 steering committee meeting.

Alternative No.	Hardware	Systems and programming staff	Applications
1	Each agency*	Each agency*	Separate
2	Central**	Central	Common
3	Central**	Central	Separate
4	Central**	Each agency	Separate
5	Central**	Central maintenance Each agency development	Separate
6	Central**	Some central Some each agency	Some common Some separate

* Based on projection for 1979, which each agency developed during the long-range data processing planning sessions.

** Central hardware is based on batch input. (All data is sent by courier service to the central computer center where it is entered into the computer. Reports are returned to each agency via courier.) Each alternative with central hardware has two variations:

1. Each agency has a remote job entry (RJE) station at the agency office which allows data to be entered into the computer from the agency office via high speed communication lines. Each agency also has a printer in the agency office which receives data for printouts via communication lines from the central data center.

2. Each agency has a minicomputer attached to the central data center via high speed communication lines (see above). The minicomputers may perform some applications in-house, including data-editing and formatting as well as acting as a remote job entry station.

After extensive review of the present equipment and applications, we feel that it would not be feasible, advantageous, or result in an immediate cost saving to use the existing hardware as a basis for a consolidated data processing center. Relocating the present equipment in a single location would not be a consolidation. There would be no reduction of hardware, personnel, or utility costs (e.g., the cost of leasing a facility to house all the existing hardware and staff would be $155,000 per year). Since, with the exception of Los Rios and Sacramento City Unified, all existing hardware is incompatible, it would not be possible to run application programs on any machine other than those machines that the application programs are presently running on. Additionally, three of the machines are operating at capacity and need to be upgraded if they are to be able to provide the same level of service as they have in the past to agencies with growing needs.

It is with the aforementioned factors in mind, including the fact that most of the agencies are contemplating additional hardware and/or personnel (or in the midst of changing) to satisfy unmet needs, that we have used the economic profile as it would exist in 1979 as a baseline.

ANALYSIS OF ALTERNATIVES

In developing a set of comparative characteristics for the analysis of alternatives, we developed two major divisions: quantitative factors and qualitative factors. Quantitative factors consist of one-time costs and recurring costs. One-time costs consist of shipping costs for equipment, disk pack purchase, site prepration, one-time education, conversion costs (contract) and supplementary personnel for system development. Recurring costs include hardware lease, personnel costs including fringe benefits, building lease, utilities, supplies, and ongoing professional education.

Qualitative factors include control, responsiveness (to current and future needs), duplication, potential for management information systems, data processing personnel development, and resource development. Definition of these factors are:

- *Control* – To what degree can each agency determine the direction of data processing emphasis or growth? Can each agency decide what and when it desires and wants from data processing?
- *Responsiveness (Current Needs)* – Can the varying needs and desires of individual users be readily satisfied? What is the ability to respond to immediate requests?

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COMPARISON

	QUALITATIVE				
ALT. NO.	CONTROL	RESPONSIVENESS – CURRENT NEEDS	RESPONSIVENESS – FUTURE NEEDS	DUPLICATION	POTEN MANA INF
①	Each agency has complete control within the limitations of its capabilities Greatest individual control.	Can respond immediately to all requests if they are within agency capability, resources and D.P. policies.	Agencies do not have capability to meet all their future needs. Least responsive.	Greatest amount of duplication exists. Least conducive to record sharing.	Least po to limita individu
②	Least individual control. Must function thru a committee.	Greatest resources available to user, but also greatest contention for some resources. Least responsive for "immediate" turnaround.	Greatest potential for long range planning and future directions.	Least duplication. Most efficient utilization of available resources.	Highest for prov level inf planning
③	District controls their own applications, but hardware and personnel are controlled thru committees.	Responsive on regularly scheduled programs. "One Shot" emergencies must go through a priority review.	Has capability to respond to future needs if agencies will agree on common needs.	Much duplication of effort and inefficient utilization of equipment.	Capabili dependi thrust district
④	Second greatest amount of individual district control.	Can be extremely responsive to user needs within schedule of hardware availability.	Can be responsive but requires extensive agency planning. Extent of data base is limited.	Must duplication of effort and inefficient utilization of equipment.	Limite for MIS hardwa exists.
⑤	Some control, thru separate development staff and separate applications.	Can be extremely responsive to user needs within schedule of hardware availability.	Can be responsive but requires extensive agency planning. Extent of data base is limited.	Much duplication of effort and inefficient utilization of equipment.	Limite MIS, al capabil
⑥	Control over those applications that are separate. Committee controls common applications	Can be extremely responsive to user needs within schedule of available resources.	Second greatest potential for long range planning and preparation for future directions.	Limited duplication. Second most efficient utilization of resources.	Secon potent based data ba applica

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N OF ALTERNATIVES

			QUANTITATIVE			
ENTIAL FOR NAGEMENT NFO. SYS.	DATA PROCESSING PERSONNEL DEVELOPMT.	RESOURCE AVAILABILITY	ONE-TIME COSTS		RECURRING COSTS	
potential due nitation of idual resources.	Personnel have the least opportunity for education and advancement	Minimum resources available.	NONE		2,468,873	
st potential roviding policy information and ing models.	Best opportunity for career advancement and education. Will attract most qualified personnel.	Greatest combination of resources is available.	Total	223,000	Batch	2,096,056
			Less Present Equipment	-325,000	RJE	2,342,198
			Net	(-102,000)	Mini	2,495,498
bility for M.I.S. nding on future t of individual ct applications	Good opportunity for advancement but personnel cannot take advantage of available resources.	Good availability of resources, but they are not used to their best advantage.	Total	425,000	Batch	2,281,596
			Less Present Equipment	325,000	RJE	2,527,738
			Net	100,000	Mini	2,681,038
ed potential IS, although vare capability .	Limited opportunity for career development.	Good hardware capability, but none of resources are used most effeciently.	Total	425,000	Batch	2,303,032
			Less Present Equipment	325,000	RJE	2,549,174
			Net	100,000	Mini	2,579,211
ed potential for although ility exists.	Limited opportunity for career development for agency development staff. Central maintenance group has good career opportunity.	Good hardware availability, but none of resources are used most efficiently.	Total	425,000	Batch	2,401,315
			Less Present Equipment	325,000	RJE	2,647,457
			Net	100,000	Mini	2,800,757
d highest tial for MIS on common bases and ations.	Good opportunity for career advancement for central staff. Limited opportunities for decentralized staffs.	Good availability of resources. Second best utilization of resources.	Total	334,000	Batch	2,283,669
			Less Present Equipment	325,000	RJE	2,529,811
			Net	9,000	Mini	2,683,111

- *Responsiveness (Future Needs)* – How flexible is the alternative? What is its capability for future growth? Will future growth require major changes in data processing systems or has this been planned for?
- *Duplication* – How efficient is the overall data processing system? Is there a maximum utilization of resources? Does this alternative lend itself to sharing – are records (e.g., interdistrict student transfers) compatible enough to be transferred between agencies with no apparent effort?
- *Potential for Management Information Systems* – Does the alternative have the capability to provide high level policy information (as opposed to operational information)? Can this information be a vital planning tool for building future models?
- *Data Processing Personnel Development* – Does the alternative provide a career path for data processing personnel? Will there be professional challenges and educational opportunities? Is there an opportunity for professional growth?
- *Resource Availability* – What level of hardware, software and personnel skills are available to each agency?

A summary of the qualitative and quantitative factors for each alternative is illustrated on the facing page.

In applying the test of economic feasibility to the alternatives, we discovered that it would *not* be economically feasible for Grant Joint Union High School District to be a participating member of a consolidated data center under Alternative Nos. 3, 4 and 5. Under those alternatives, Grant would be better served, from a cost-effectiveness standpoint, as a user of another participant in the consolidated center. However, under Alternative Nos. 2 and 6, Grant could pass the test of economic feasibility as a participant in a consolidated data center.

CONCLUSION

Based on our fact-finding and analysis, we do not believe that immediate consolidation would be either economically or technically feasible. However, based upon a five-year projection of the agencies' needs and resources, several forms of consolidation are both economically and technically feasible.

II – INTRODUCTION

There are five computer installations in Sacramento County serving public education in kindergarten through community college (grades K-14). Four of these are included in the following school districts:

- Grant Joint Union High School District
- Los Rios Community College District
- Sacramento City Unified School District
- San Juan Unified School District.

The fifth installation is under the jurisdiction of the Sacramento County Office of Education and operates as a regional data center serving schools and districts in 18 Northern California counties including Sacramento County.

During the past few years the Education Committee of the Sacramento County Grand Jury has felt that the electronic data processing usage in the County for educational purposes would be more effective and efficient if consolidated under one operation.

On July 6, 1972, representative Governing Board members of Grant Joint Union High School District, Los Rios Community College District, Sacramento City Unified School District, San Juan Unified School District and the Sacramento County Office of Education, hereafter referred to as "agencies," constituted themselves as an Electronic Data Processing Study Steering Committee which had as its objective the determination of the feasibility of the consolidation suggested by the Grand Jury findings.

It was determined that an objective study should be conducted by a qualified consulting firm and the EDP Study Steering Committee has selected the Sacramento County Office of Education to act as the contracting agency. The funding for the study was provided through the State of California, Senate Bill 804, Chapter 1167 of the 1973 legislative session

"... re the feasibility of combining existing data processing centers ..." (see Exhibit A). Section 3, SB 804 states:

> "The consulting firm selected to report shall respond to the following:
>
> (a) Identification of similarities and differences of policies and goals of the existing district and county superintendent of schools operations.
>
> (b) Identification of similarities and differences in operations and services of the data processing centers.
>
> (c) In the areas of education, administration and business, determine the long-range goals for electronic data processing.
>
> (d) Provide an analysis of various alternatives in the field of data processing to achieve the goals reported in subdivision (c) of this section."

On November 8, 1973, the EDP Steering Committee issued a Request for Proposal (RFP) to select a consultant to perform the feasibility study. Peat, Marwick, Mitchell & Co. was selected. The study commenced on June 3, 1974.

III – EDUCATIONAL PHILOSOPHIES, POLICIES AND GOALS

A practical definition of long-range data processing goals is properly dependent on, and related to, the unique educational philosophies, policies and goals of the five agencies. Therefore, our first step was determination of the similarities and differences of these elements.

We recognized that, in some cases, the agencies' educational philosophies, policies, goals, and related matters are documented. We reviewed this material. To make our review of that material more effective, we gathered and reviewed material relating to each agency's environment, operating statistics (financial, pupil and community orientation) as well as any other pertinent material. We then proceeded to meet individually with key personnel in the agencies as well as with selected members of the Board of Education of each agency.

After reviewing materials and interviewing personnel, we discovered that the high-level goals of each agency are very similar: Provide the best possible education and maintain fiscal responsibility. However, the policies of each agency tend to differ due to the size of the population served and the type of services provided (e.g., the County Superintendent of Schools provides only special services, Grant serves only junior and senior high schools, Sacramento City Unified and San Juan Unified serve grades K-12, and Los Rios serves a junior college population). The very nature of the diversity in size of student population (10,000 to 70,000) and services provides a logical base for different policies being required to meet different problems. However, the type of information necessary to make those policy decisions is a common need of all the agencies.

Some comparative information appears in Figure 1 on the following page.

Appendix A contains a glossary of abbreviations and definitions that may be helpful to the reader in reviewing this report.

Figure 1
AGENCY COMPARATIVE DATA

	Grant	Los Rios	Sacramento City USD	Sacramento County	San Juan
• Enrollment (including adults)	16,872	30,957	59,059	78,008	61,838
• Number of schools	14	3	77	89	79
• Agency budget (millions)	13.7	24.5	48.9	N/A	48.8
• Data processing budget expressed as a percentage of agency budget	0.33%	1.15%	0.6%	–	0.38%
• Grades served by agency	7-12 adults	13, 14 adults	K-12 adults	Special Schools and support function	K-12 adults
• Agency maintains Special Schools	Yes	N/A	Yes	Yes – only type run by County	Yes
• Schools within agency have parent advisory committees	Yes	N/A	Yes	N/A	Yes
• Functional segment of agency most serviced by data processing	Business office	Well proportioned among: Business, education support, instruction	Equally divided between: Business, education support	Primarily education support	Equally divided between: Business, education support
• Agency allows site administrator relative control over portions of budget	Yes	Yes	Yes	N/A	Yes
• Vocational educational program in data processing	Limited to unit record equipment in senior high schools	Complete program leading to an A.A. degree	No district program	No County program	District program offers classes at Marconi Technical
• Research department	None	No central department research at each college campus	Large central research department with assistant superintendent of research	Central research department with director	Central research department with director
• Data processing initiates regular meetings with educational users	No	Head of D.P. acts as regular liaison	Full-time education consultant	Two full-time education consultants	No major time or personnel commitment

IV – DATA PROCESSING CENTER OPERATIONS AND SERVICES

An integral part of this study was the identification of the similarities and differences in operations and services of the five data processing centers. Determination of these similarities and differences involved the development of a profile of each center. To expedite the development of the profiles and conserve time of center management and staff, we first collected and reviewed each agency's budget, organization charts, systems and programming standards, hardware configurations, and utilization statistics. Figure 2 illustrates the computer hardware at each agency. Figure 3 illustrates the staffing at each agency.

We then developed an interview guide for data center management (see Exhibit B). After interviewing data center management, the next step in the in-depth review of each data center was to interview the professional staff (management, systems and programming) in order to evaluate the skills of the present data processing staffs. The key objective of this part of the study was for us to learn all we could regarding each center, identifying the areas of similarity and difference.

The RFP lists those applications currently operational at each center. We fully understand that each application was designed to meet the unique needs of each agency and, therefore, commonality may be in name only. To assess the degree of commonality of existing applications, we developed an applications description questionnaire (see Exhibit C). One questionnaire was completed for each application by the staff members of each agency who were most knowledgeable about that application. We interviewed users of every major application to better assess the use of the application's end products. Figure 4 illustrates the recipients of each application's end product at each agency. (Figure 4a contains the coded key to abbreviations of applications in Figure 4.)

Appendix B contains detailed descriptions of each major application area including: flowcharts or charts of interrelationships, narrative descriptions of major commonalities and differences, and average run times for each agency's use of each application. Appendix C contains a description of the unique nature of separate funds in school finance.

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COMPARISON OF DATA PROCESSING EQUIPMENT BY AGENCY

	VENDOR NO. MODEL	MAIN MEMORY	DISK NO. DRIVES	DISK (MILLIONS OF BYTES)	TAPE NO. DRIVES	TAPE BPI	PRINT SPEED	CARD READ SPEED	CARD PUNCH SPEED	AVERAGE (SHIFTS) UTILIZATION	PEAK (SHIFTS) UTILIZATION	SLOW (SHIFTS) UTILIZATION	TYPE DATA ENTRY	NO. KEY (PUNCH, TAPE, DISK) P T D	NO. VERIFIERS (IF SEPARATE)	OPTICAL SCAN EQUIP NO. (TYPE)	INTERPRETER NO. (TYPE)
GRANT	UNIVAC 1005	4K	0	–	0	–	400	400	200	1	1 1/2	3/4	CARD	2P	0	1 (514)	1 (557)
LOS RIOS	IBM 360/30	65K	4	29	4	1600	600	400	150	1 3/4	2 3/4	1 1/4	CARD + DISK	2P 3D	0	1 (1230)	1 (548)
SAC COUNTY	HW 2200	65K	2	18.4	6	556	1100	800	400	2 1/4	2 3/4	1 1/2	CARD	3C	2V	1 (OPSCAN 100)	1 (557)
SAC CITY	IBM 360/30	65K	4	29	4	1600	1100	1000	300	2 1/2 +	2 3/4 +	2 1/8 +	TAPE	5T	0	1 (1230)	2 (557)
SAN JUAN	UNIVAC 9480	65K	2	58	2	800	1100	1000	250	1 3/4	2 1/2	1 1/2	CARD	4P	0	1 (1230)	1 (557)

FIGURE 2

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COMPARISON OF DATA PROCESSING STAFFING BY AGENCY

	TITLE HEAD OF EDP	TOTAL NO. STAFF	ASST HEAD	NO. SYSTEMS ANALYSTS (INCLUDE SUPVR)	NO. PROGRAMMERS (INCLUDE SUPVR)	TOTAL ANALYSTS AND PROGRAMMERS	TOTAL DATA ENTRY STAFF	TOTAL OPERATORS	TOTAL CONTROL	TOTAL CLERICAL	TOTAL CONSULTANTS	MISC.
GRANT	BUS MGR	4	–	–	1	1	2	1	–	–	–	
LOS RIOS	MGR	16	NO	3	5	8	3 PLUS 1 SUPVR.	2	1/2	1/2	0	
SAC COUNTY	DIR	22	YES	1/2 PLUS 1 SUPVR.	1 1/2	3	5 PLUS 1 SUPVR.	3	2	1	2	2 TEST ADMINISTRATORS 1 SHIPPING CLERK
SAC CITY	DIR	23	NO	COMBINED FUNCTION		6 INCL SUPVR.	6 INCL SUPVR.	6 INCL SUPVR.	3 INCL SUPVR.	0	1	
SAN JUAN	DIR	13	NO	0	3 1/2	3 1/2	3	3 1/2	0	2	0	

FIGURE 3

5

FIGURE 4

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PRIMARY RECIPIENTS OF DATA PROCESSING REPORTS

	GRANT	LOS RIOS	SCUSD	SAC COUNTY	SJUSD
SUPT.	H6, A1	H6		H6	D4
ASS'T. SUPT. BUS	A10, B3, H6, A1	H6		H6	
BUS. MGR.	A10, D3, H6, A1				A1
DIR. ACCT'G/BUDGET	A8	A1, A2, A9, B1, C1, C2 D3, G1, G2, G10, G14 A3, D1, H14	A3, A7, A9, B1, H23 A1, A2, C2, D2, D3, E1	A1	A1, A4, A13, B1, C1, C2 D3
PURCHASING AGENT	A9	A9, C1, B1			A12, C1
PAYROLL	E1	E1	D3, E1		E1
DIR. FOOD SERVICES	A3, A11		A3		A3
DIR. MAINT.					
DIR. TRANS.	A13				
ASS'T SUPT. PERSONNEL	H6	H6	H6	H6	D4
DIR. CERT. PERS.			D3, E1		
DIR. CLASSIFIED PERS.			D3, E1		
ASS'T SUPT. INST.	H6	F1, F7, H6		G4, G7, H6	
ATTENDANCE OFFICE			G4		G9
DIR. CURRICULUM A/V	H4		H4	H4, H11	
DIR. VOC. EDUCATION		G15			
SCHOOL PRINCIPALS	A7, A10, A8	(DEANS) G3, G10, G17, H6	A1, A7, G3, H8, H11, H16	F8, G3, G4, G10, G18, H6	F7, G3, G7, G13, H4
VICE PRINCIPALS			G7	G3	
SCHOOL COUNSELOR		G14	G3, G7, G9, G11, H16	F8, G3, G4, G7, G8, G9 G18	G14, G18
FINANCIAL AID OFFICE		A5, G6, G16, G11			
TEACHERS	F8, G13	F8, H6	F8, G3, G7	F8, G7, G8	G3, G13, G14, H25
STUDENTS		F2, F3, F4, F5 G7	G7	G7	G7
ASS'T SUPT. SPEC. SERVICE	H2, H6	H6	G14, H7, H22		
RESEARCH		F6, G11, G15, H14	D1, F7, G8, G13, G14, H2 H3, H8, H24	H19, H20, H21	D1, G7, G13

Figure 4a
KEY TO ABBREVIATIONS

A1	Budgetary
A2	Building and Site
A3	Cafeteria
A4	Duplication
A5	Financial Aid (Student)
A6	Maintenance Expense
A7	Property
A8	Shops and Industrial Arts
A9	Stores
A10	Student Body Accounting
A11	Student Store (Bookstore)
A12	Telephone
A13	Transportation
B1	Accounts Payable and Purchasing
C1	Daily Account Balances
C2	Tabulation of Tentative, Published, Final Budgets
D1	Enrollment Projections
D2	Income Projection
D3	Salary Projections
D4	Salary Schedule (Evaluation and Comparison)
E1	Payroll/Personnel
F1	Development of Master Schedule of Classes
F2	Programming – Assembler
F3	Programming – COBOL
F4	Programming – FORTRAN
F5	Programming – RPG
F6	Teacher Evaluation by Student
F7	Teacher Load Reporting/Class Size
F8	Test Scoring/Surveys
G1	Adult Fee Billing
G2	Census Day Attendance Reporting
G3	Class Scheduling/Registration
G4	Education Planning Series
G5	Evaluation for Graduation
G6	Financial Need Analysis
G7	Grade Reporting
G8	Longitudinal Test History Reporting
G9	Monthly Attendance Reports
G10	October Reporting
G11	Post Semester Grade Point Analysis
G12	Probation/Dismissal Determination
G13	Standardized Testing
G14	Student/Counselor Lists and Reports
G15	Student Follow-up
G16	Student Loan Billing
G17	Student Profiles
G18	Transcript Preparation
H1	Adult Education Special Project
H2	AFDC Court Correlation
H3	Attendance Boundary Simulation
H4	A/V Catalog
H5	Community College Facilities Inventory
H6	Employee Directory
H7	Field Trip Scheduling and Reports
H8	Grade Code Directory
H9	In-service Training
H10	Instrumental Music Inventory
H11	Library/Textbook Activity
H12	Random Sampling for Auditing
H13	School-based Computer System
H14	Statistical Routines for Research
H15	Student Body Election
H16	Student Directory
H17	Student Injury Reporting

DATA CENTER PROFILES

The profiles which follow are capsule descriptions of the unique data processing environment at each agency.

Grant Joint Union High School District

Grant runs a small data processing center based on a 4K card-oriented UNIVAC 1005. They have four full-time data processing staff (one programmer, one computer operator, and two keypunch operators). The equipment is used less than one shift a day.

The primary purpose of the computer is business operations and almost all the applications are in that area. Grant does provide some test scoring services; however, this is not a primary function.

The Director of Data Processing is the Business Manager, who is the principal user. He does not foresee a large expansion of services outside the business area. In September 1974 a Frieden-Singer minicomputer was installed at the Grant District offices to complement the UNIVAC 1005. The minicomputer will primarily be used to develop a small on-line budget system.

Los Rios Community College District

Los Rios' data processing center is built around a 65K IBM 360 Model 30. A staff of 16 (half of whom are systems analysts or programmers) provide a basis for this operation. They provide administrative support to the district office, pupil personnel services to each of the three college campuses, plus a full shift dedicated to direct instruction supporting the career education programs offered at the colleges.

The center is in regular contact with its users and has established many close working relationships. The center staff have attempted to keep abreast of current technology in planning for on-line data base systems.

The present equipment is being used two full shifts and is not adequate to provide the type of services that users are requesting for the near future.

Sacramento City Unified School District

Sacramento City School's data processing center consists of a 65K IBM 360 Model 30. A staff of 23 (six of whom are analysts/programmers) provide a basis for this overburdened operation. They provide a comprehensive set of business applications to the district office, extensively support the research department, and provide vast amounts of services to the schools in the district.

The present equipment is running three full shifts and has no further capacity to meet the growing needs and information demands of this district.

The district maintains a full-time educational consultant who has responsibility for educating users in the schools and helping them to articulate their needs through implementation. He has been a major factor in the continued growth of services to the schools.

The district administrative staff is aware of how a computer can be major part of their future plans, but are presently hesitant about committing adequate funds to the development of such a plan.

Sacramento County Regional Center

The County's regional data processing center is built around a 65K Honeywell 2200. A staff of 22 (three of whom provide the entire systems and programming support) provide a basis for this operations-oriented facility. The regional center acts as a service bureau, providing application packages (with some options) in the area of pupil personnel services. The center's existence depends on "selling" its services to small county offices and school districts in Northern California. Two full-time educational consultants act as the liaison/salesmen to users.

Center staff would like to redesign the pupil package that they are presently using. However, with a systems and programming staff of three, the bulk of their effort is directed to maintenance of operations. They are in need of additional funding for a development staff to provide a base of expanded services to users.

The present equipment is being used more than two and one-quarter shifts and is not adequate to provide the type of services that users are requesting for the near future.

San Juan Unified School District

A recently installed (August 1974) 65K UNIVAC 9480 will provide the main frame around which San Juan data center is built. A staff of 13 (three programmers) provide the support for the facility. They are in the midst of a conversion from IBM 1401 Autocoder to UNIVAC Assembler and COBOL (as of November 1, 1974, the conversion .was 42% completed). The center presently offers services in the areas of business and pupil personnel, although the latter is rather limited in scope.

V – LONG-RANGE DATA PROCESSING GOALS

Realistic long-range goals for electronic data processing are properly dependent on the educational philosophies, policies and goals of the five agencies. Implementation of these philosophies, policies and goals, in many cases, creates needs on the part of the users – needs that can be most cost-effectively satisfied through use of data processing. To ensure a satisfactory degree of precision in long-range data processing goals, the overall needs of the users require definition. These user needs can then be summarized and translated to be input for the formulation of the data processing goals of each agency. It should be pointed out that the term "user," in this discussion, would also include entities within each agency not currently receiving data processing services, but who may have a need for such services. Appendix D illustrates user attitudes, suggestions, and current and future needs for data processing based on user interviews at each agency.

To determine the future plans with respect to data processing needs of the five agencies, planning sessions were arranged with each superintendent and the assistant superintendents of instruction and business services. For purposes of these sessions, a two-hour period was set aside during which the key decision-making administrators were asked to discuss the needs of the agency covering the next five years. During these planning sessions the discussions centered around three major areas of district needs: (1) education support services, (2) direct instruction, and (3) business services. The interviews were structured in this manner to ensure that all areas were given appropriate attention and that decision-making administrators for each of the areas were present in the same meeting so that overlapping functions between these areas would be adequately covered.

Each of the categories was covered in the order designated by the superintendent and his staff. Members of the staff were encouraged to mention all management information needs regardless of whether or not these needs might represent applications that would be appropriate tasks to accomplish through data processing. After each of the three major areas of applications was discussed, agency staff members were asked to prioritize the applications within each major category. Thereafter, the staff members were asked to establish an overall composite priority list between applications in all categories. In some instances where time became a constraint, these separate priority lists were left with the agency to provide staff members with additional time to complete the task and were collected at a later date. Exhibit D identifies the staff members from each agency who participated in the interviews.

Figure 5 provides a matrix display of priorities for all agencies. The original priority lists represented agency staff judgments of what should occur in the agency if there were neither funding nor time constraints. In a subsequent and separate process, these priority "want" and "dream" lists were made available to the agency to review and refine to realistic lists of applications that more accurately represent what the agency expects to afford by the end of the five-year period. Additionally, each agency was asked to attach a dollar amount to each application representing the amount the agency was willing to allocate to data processing within the budget constraints of the agency. That information appears in Section VI of this report under the caption "Alternative No. 1."

Figure 5
RESULTS OF LONG-RANGE EDP PLANNING SESSIONS

	Grant	Los Rios	Sacramento City USD	Sacramento County	San Juan
Data base/data communications system and data entry with random inquiry	X	X	X	X	X
Proposed data bases:					
Budget and control system	X	X	X	X	X
Payroll/personnel and control system	X	X	X	X	X
Stores inventory	X		X	X	
Student activity accounting			X		
Book inventory			X		X
Plant inventory			X	X	
Student	X	X	X	X	X
Special education			X		
Instructional materials/personnel – include community resources inventory and ordering		X	X	X	X
Community demographic information		X	X	X	X
Teacher made tests			X		X
Potential employees (and/or substitutes)		X			X
Common courses (description and numbers)		X	X		
Legislative activity and education code				X	
On-line student guidance/counseling system		X	X	X	X
On-line attendance system (Ala Kennedy H.S.)	X		X	X	
On-line registration		X	X		X
Modular scheduling (∞ variations)				X	X
Master schedule builder			X	X	
On-line scheduling and transfers for special education			X		
Alert/security system			X		
Individualization of instruction (diagnosis and prescription)	X	X	X	X	X
Criterion reference testing	X	X	X	X	X
Teach data processing – vocational education		X	X	X	X
Data processing supplement in classes (math, science, accounting, etc.)		X	X	X	X
CAI/CMI		X	X	X	X
Needs assessment (community, student, teacher – in service)			X	X	
Research – develop indicators – for early detection of potential special education, dropouts, truants	X		X		
Microfilm/fiche system tie with computer control			X		
Automated record transfer to community college			X		
On-line suspension notices			X		X
On-line permits for community facility utilization and services			X		
On-line modular parental letter writing			X		
Facility for job updating – teach current state of art in data processing		X			

	Grant	Los Rios	Sacramento City USD	Sacramento County	San Juan
Build model for five-year projection of student and dollars	X	X			X
Building maintenance and alteration scheduling		X			X
Machinery/auto maintenance and use scheduling		X			X
A/V and learning center materials scheduling		X		X	
Union library catalog/utilization studies/acquisitions		X			X
Employee evaluation file		X			
Program evaluation – cost distribution (program accounting)		X			X
Expanded research (institutional) capability				X	
Facility planning				X	X
Transportation scheduling				X	X
On-line warrant writing (for county offices)				X	
Self-insuring among districts (cost and inventory studies)				X	
Salary projection (simulation for teacher negotiations)				X	X
Budget building and simulation				X	
Establishing tax rate				X	
SB 90 computations				X	
Long-range study of pupil progress	X				X
Follow-up studies	X				X
Average class size analysis	X				
Report card (junior high school)/GPA	X				
Faster turnaround on testing	X				
Cost accounting for maintenance					X
Teach general computer education and literacy					X
On-line testing					X
Problem-solving					X
Daily attendance information					X
Data base for making decisions about curriculum (trends)					X
General simulation/planning model					X
General mandatory reports to Board, State, Federal, other agencies					X

VI – ANALYSIS

The fact-finding and analysis discussed in Sections III, IV, and V provided the following information:

- The similarities and differences of the five agencies' educational philosophies, policies and goals.
- A profile of each data processing center in terms of organization, staffing, equipment costs, capacities, operations and services provided to users.
- The similarities and differences of the five agencies' long-range data processing requirements and goals.

As a part of this fact-finding, we interviewed over 225 people, visited over 35 sites and attended board meetings at each agency. The results of this fact-finding served as input to the analysis of the alternative plans of data processing consolidation. Our experience in analyses of this nature indicates that not all of the results are subject to a determination of cost-effectiveness. Where possible, we evaluated the cost-effectiveness of each facet of the plan, but there were certain advantages and disadvantages intrinsic to each alternative that did not lend themselves to quantification. These related to unique operational requirements and desires of the individual agencies. Each of these advantages and disadvantages was discussed and combined with those elements that have been subjected to a cost-benefit and cost-effectiveness analysis. The result was a combination of quantitative and qualitative considerations applicable to each alternative which appears in matrix form later in this section of the report.

ASSUMPTIONS

In the development of approaches to consolidation, we applied the following assumptions to each alternative:

- Consolidation alternatives must result in no degradation of service.
- Consolidation alternatives must be both technically and economically feasible.
- Consolidation alternatives must allow for future needs.

- Where possible, software packages (vendor supplied, commercially marketed, or existing systems) will be substituted for custom software equipment.
- As most of the agencies are contemplating additional hardware and/or personnel to satisfy unmet needs, the economic profile as it would exist in 1979 is used as a baseline.
- Certain functions will remain as agency responsibilties, e.g., data entry, educational consultants, data processing coordinators.
- Hardware cost estimates are based on the average of prices supplied by five vendors.
- Hardware cost estimates are based on one-year lease cost, although final arrangement may be long-term lease or purchase.
- Personnel costs are based on five percent annual inflation and include all fringe benefits.
- Capability for on-line systems is included in all consolidated hardware alternatives.
- The costs of terminals, lines and modems (required to implement on-line systems) are an individual agency cost and are not included in this study, except for remote job entry (RJE) alternatives.

DEVELOPMENT OF ALTERNATIVES

We originally considered over 30 different alternatives for consolidation before narrowing the list down to its present size. Economic and technical feasibility tests were applied to each alternative.

After extensive review of the present equipment, staffing and applications, we feel that it would not be feasible or advantageous, nor would it result in an immediate cost saving to use the existing hardware as a basis for a consolidated data processing center. Relocating the present equipment to a single location would not be a useful or equitable consolidation. There would be no reduction of hardware, personnel, or utility costs. The cost of leasing a central facility to house all the existing hardware and staff would be $155,000 per year, plus additional costs of site preparation and moving for delicate computer equipment.

With the exception of Los Rios and Sacramento City Unified, all existing hardware is incompatible; therefore, it would not be possible to run application programs on any machine other than those machines on which the application programs are presently running.

Additionally, three of the machines are running at or near capacity and need to be upgraded if they are to be able to provide the same level of service as they have provided in the past to agencies with growing needs.

It is with the aforementioned factors in mind, including the fact that most agencies are contemplating additional hardware and/or personnel (or are in the midst of changing) to satisfy current needs, that we have used the economic profile as it would exist in 1979 as a baseline.

We visited many data centers (including the Teale Data Center) to validate many of our assumptions. After much consideration, we presented the following list of alternatives to the Electronic Data Processing Steering Committee on September 5, 1974.

Alternative No.	Hardware	Systems and programming staff	Applications
1	Each agency*	Each agency*	Separate
2	Central**	Central	Common
3	Central**	Central	Separate
4	Central**	Each agency	Separate
5	Central**	Central maintenance Each agency development	Separate
6	Central**	Some central Some each agency	Some common Some separate

* Based on projection for 1979, which each agency developed during the long-range data processing planning sessions.

** Central hardware is based on batch input. (All data is sent by courier service to the central computer center where it is entered into the computer. Reports are returned to each agency via courier.) Each alternative with central hardware has two variations:

1. Each agency has a remote job entry (RJE) station at the agency office which allows data to be entered into the computer from the agency office via high speed communication lines. Each agency also has a printer in the agency office which receives data for printouts via communication lines from the central data center.

2. Each agency has a minicomputer attached to the central data center via high speed communication lines (see above). The minicomputers may perform some applications in-house, including data-editing and formatting as well as acting as a remote job entry station.

ALTERNATIVE NO. 1 – "BASELINE"

This alternative assumes *no* consolidation in any area. However, it also assumes that the long-range plans of each agency will be fully implemented as indicated. Each agency would upgrade its hardware as needed to meet the individual requirements of its future needs. Staff would be hired and trained by each agency as needed to maintain present levels of service and create the new service articulated in the long-range planning sessions. Each agency would maintain and operate its present applications as well as individually develop new applications.

Essentially, the operations and organization would be the same as the present, with whatever improvements each agency wished to make.

The cost of implementing this alternative over the next five to seven years represents the baseline against which all consolidation alternatives are weighed.

The long-range plans of each agency (based on the results of planning sessions described in Section V of this report) include the following changes.

Grant Joint Union High School District

Grant plans no major changes in hardware or staffing over the next five years. With the present staff and equipment and some minor budget increases, they plan on implementing the following applications and tasks:

1. Budget data base system
2. Forecast model for budget
3. Revaluation of present applications (maintaining present levels of service)
4. Student records data base
5. Transiency reports
6. Testing improvement (evaluation-Stuhl Bill)
7. Dropout studies

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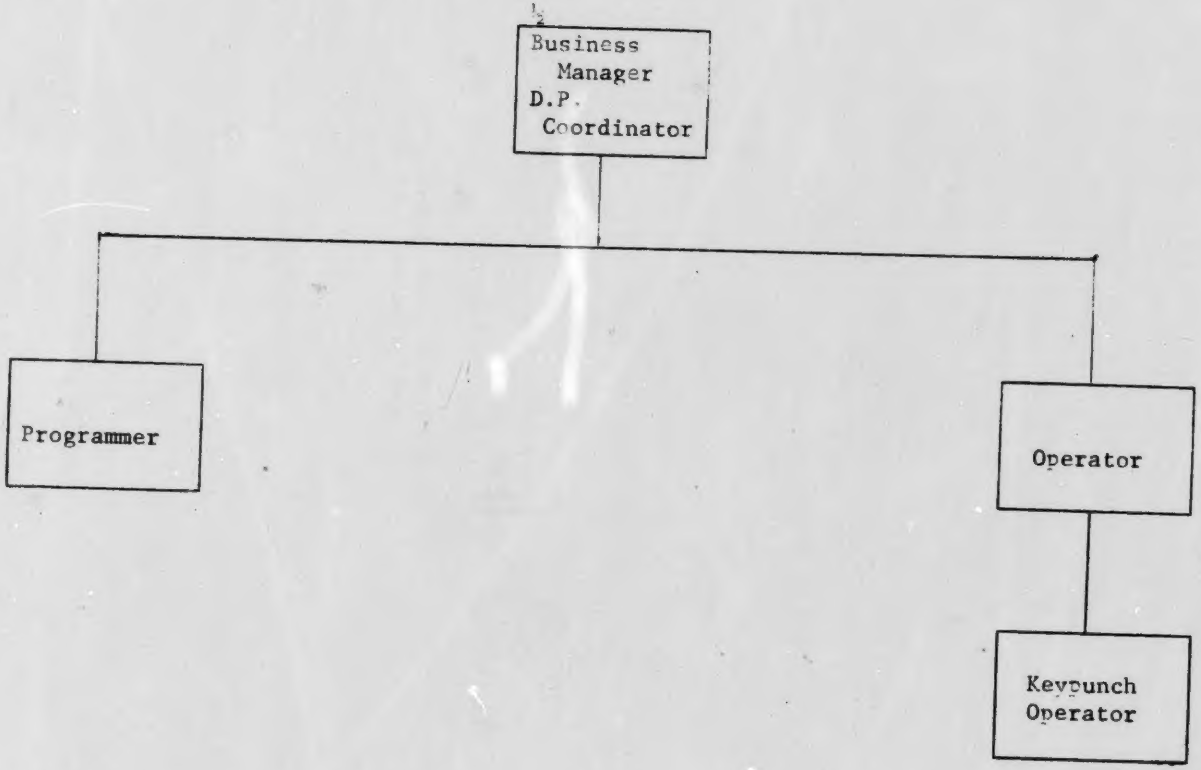
FIGURE 6

ALTERNATIVE #1 STAFFING
GRANT JOINT UNION HIGH SCHOOL DISTRICT


Business Manager D.P. Coordinator
Programmer
Operator
Keypunch Operator

8. Report cards and grade point analysis

9. Attendance

10. Average class size analysis

11. Follow-up studies

12. Long-range study of pupil progress

13. Individualization of instruction

    a. Criterion reference testing
    b. Diagnosis
    c. Prescription

Figure 6 shows Grant's data processing staff organization for 1979. Since Grant has no plans for adding additional staff, Figure 6 reflects the present data processing organization.

Los Rios Community College District

A multitask computer with communications capabilities will be acquired in the near future. A data base administrator and a full-time data control clerk will be added to the staff. This additional capability will allow for the development of such applications as:

1. Development of a data base management system with terminals for inquiry and update (As stated under the caption "Assumptions," the costs of terminals, lines and modems are an individual agency cost and are not included in this study.)

2. Budget personnel control system

    a. Computer support for notification of employee evaluation
    b. Review and modification of content of an enployee data base
    c. Development of a "potential employee" data base

3. Improvement of the data processing instructional program, including:

    a. The data processing program for vocational students
    b. The data processing instructional program for upgrading employees' skills
    c. The data processing program for nonvocational students (general education, mathematics, science, etc.)

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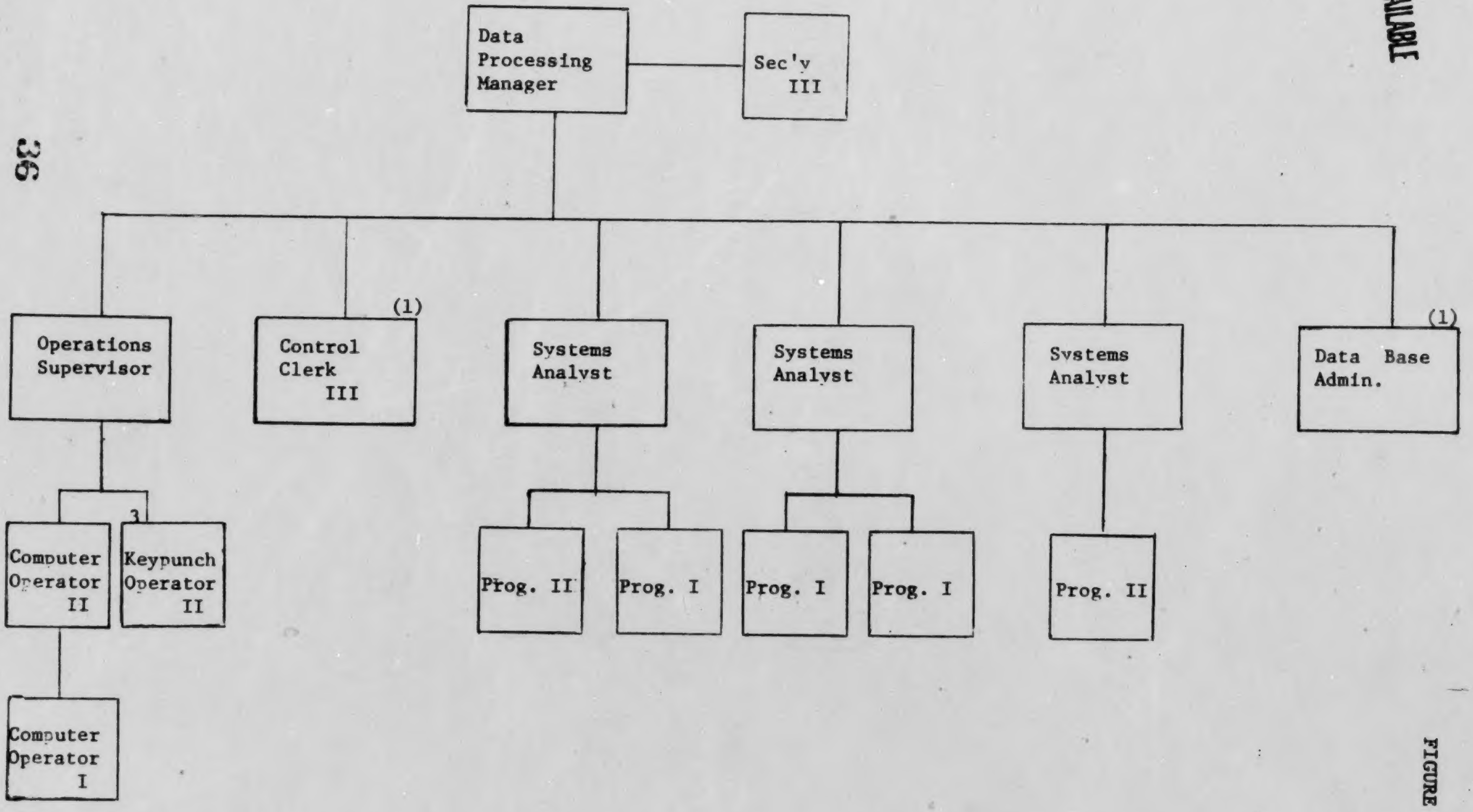
FIGURE 7

ALTERNATIVE #1 STAFFING

LOS RIOS COMMUNITY COLLEGE DISTRICT


Data Processing Manager
Sec'y III
Operations Supervisor
(1)
Control Clerk III
Systems Analyst
Systems Analyst
Systems Analyst
(1)
Data Base Admin.
3
Computer Operator II
Keypunch Operator II
Computer Operator I
Prog. II
Prog. I
Prog. I
Prog. I
Prog. II

Number in ( ) shows staff additions between 1974 - 1979

4. Projection – Both students and budget
    a. Review and modification of content of student data base
    b. Community demographic data base
5. Building, maintenance and alterations scheduling (leading into cost accounting)
6. On-line registration
7. Investigation of:
    a. Computer-assisted instruction (CAI)
    b. Computer-managed instruction (CMI)
8. Acquisition and union catalog system for:
    a. Library
    b. Learning center
    c. Audio-visual materials
9. Cataloging of course description to accompany a common course numbering system
10. Investigation of a counseling support system
11. Development of cost information by academic program
12. Vehicle usage/maintenance information system.

Figure 7 shows Los Rios' staffing organization for 1979.

Sacramento City Unified School District

The district plans to add 2314 type disk drives (fourfold increase over present disk capacity) and an additional 32K (50% increase) of core memory to their purchased IBM 360/30. No increase in staff is contemplated. They plan to add such applications as:

1. Development of indicators
    a. Truancy
    b. Dropouts
    c. Educational goals

FIGURE 8

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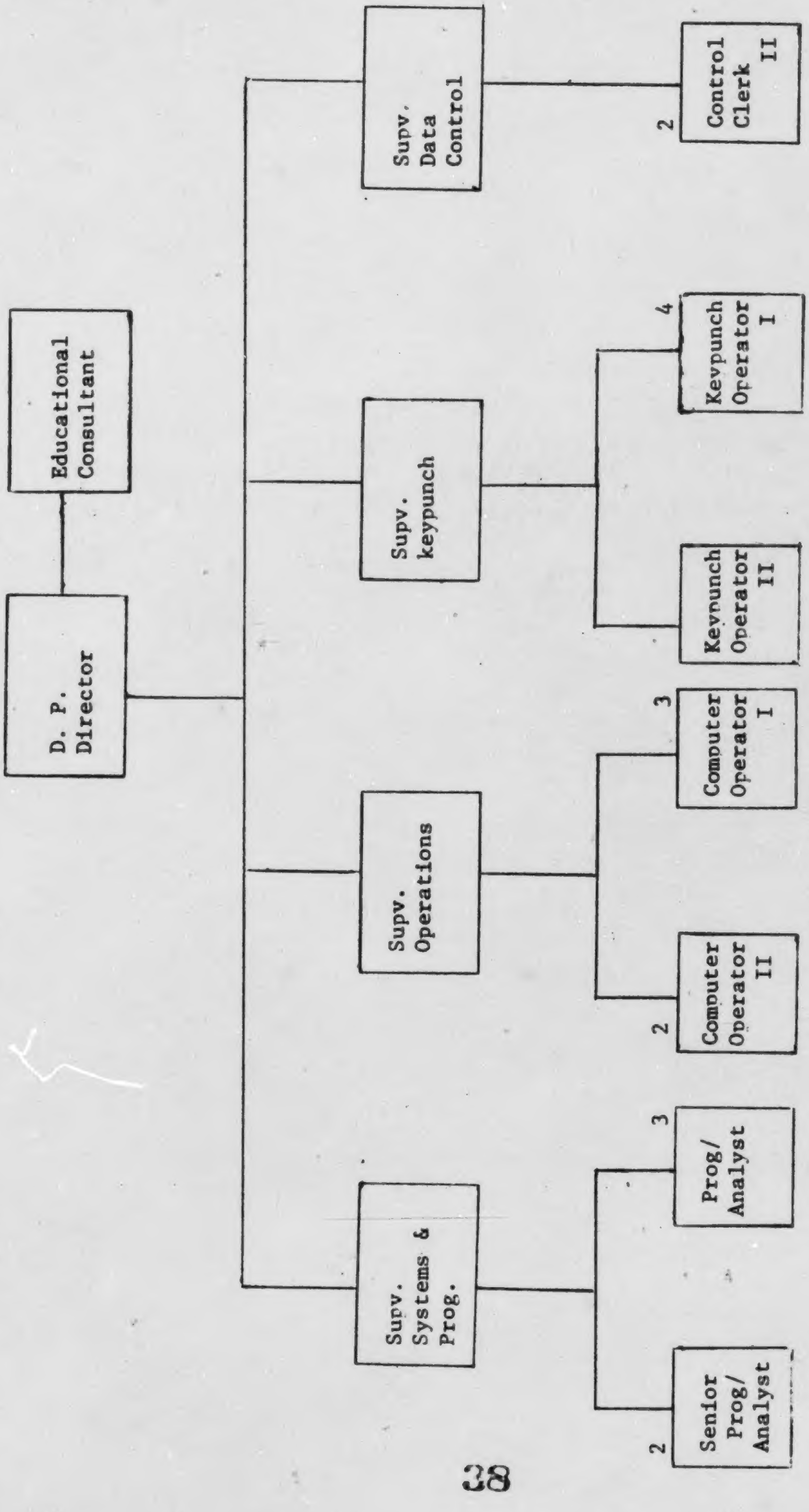
ALTERNATIVE #1 STAFFING
SACRAMENTO CITY UNIFIED SCHOOL DISTRICT


D. P. Director
Educational Consultant
Supv. Systems & Prog.
Supv. Operations
Supv. keypunch
Supv. Data Control
2 Senior Prog/ Analyst
3 Prog/ Analyst
2 Computer Operator II
3 Computer Operator I
Keypunch Operator II
4 Keypunch Operator I
2 Control Clerk II

2. Needs assessment
    a. Community
    b. Student
    c. Teacher
3. Development of indicators for early recognition of special education candidates
4. Modular letters to parents
5. Community demographic data base
6. System to issue permits for community utilization of district facilities
7. Special education integrated into student data base
8. Automatic transfer of student record to Los Rios.

Additionally, they have developed a contingency plan in the event that funds become available which would allow the purchase of a new computer with telecommunications capability and the addition of more systems and programming staff. That plan appears to be similar to the plans set forth by Los Rios and Sacramento County in their data base/data communications orientation.

Figure 8 shows Sacramento City's staffing for 1979 (based on no additional staff).

Sacramento County Regional Center

The regional center plans on acquiring a new computer capable of multitasking and teleprocessing. They plan to offer distant users the option of remote job entry. Data center staff will be expanded over a five-year period from the present staff of 22 to a 1979 figure of 41. The increased hardware and staff will enable the regional center to offer a management information system capability. Among the applications to be developed within that capability are:

1. Comprehensive pupil personnel data base system
    a. Grading
    b. Testing
    c. Cumulative record

2. Comprehensive on-line data base
    a. Counseling
    b. Guidance
    c. Career exploration
3. On-line student data base (the cost of terminals, lines and modems are an individual agency cost and are not included in this study)
4. Individualization of instruction
    a. Criterion reference testing
    b. Diagnosis
    c. Prescription
5. On-line attendance system (e.g., Kennedy High School)
6. Flexible scheduling package
7. Master schedule builder
8. Educational resources data base (including community resources)
9. Refinement and addition of flexibility to present system (data base)
10. Capability to assist districts in research projects
11. Demographic data base
12. Audio-visual scheduling
13. Development of indicators for early recognition of special education candidates
14. Teaching of data processing – vocational education
15. Computer-assisted instruction (CAI)
16. Computer supplement in the curriculum (mathematics, science, accounting, etc.)
17. On-line payroll/personnel data base
18. On-line budget data base
19. On-line data entry for warrant writing

integrated data base

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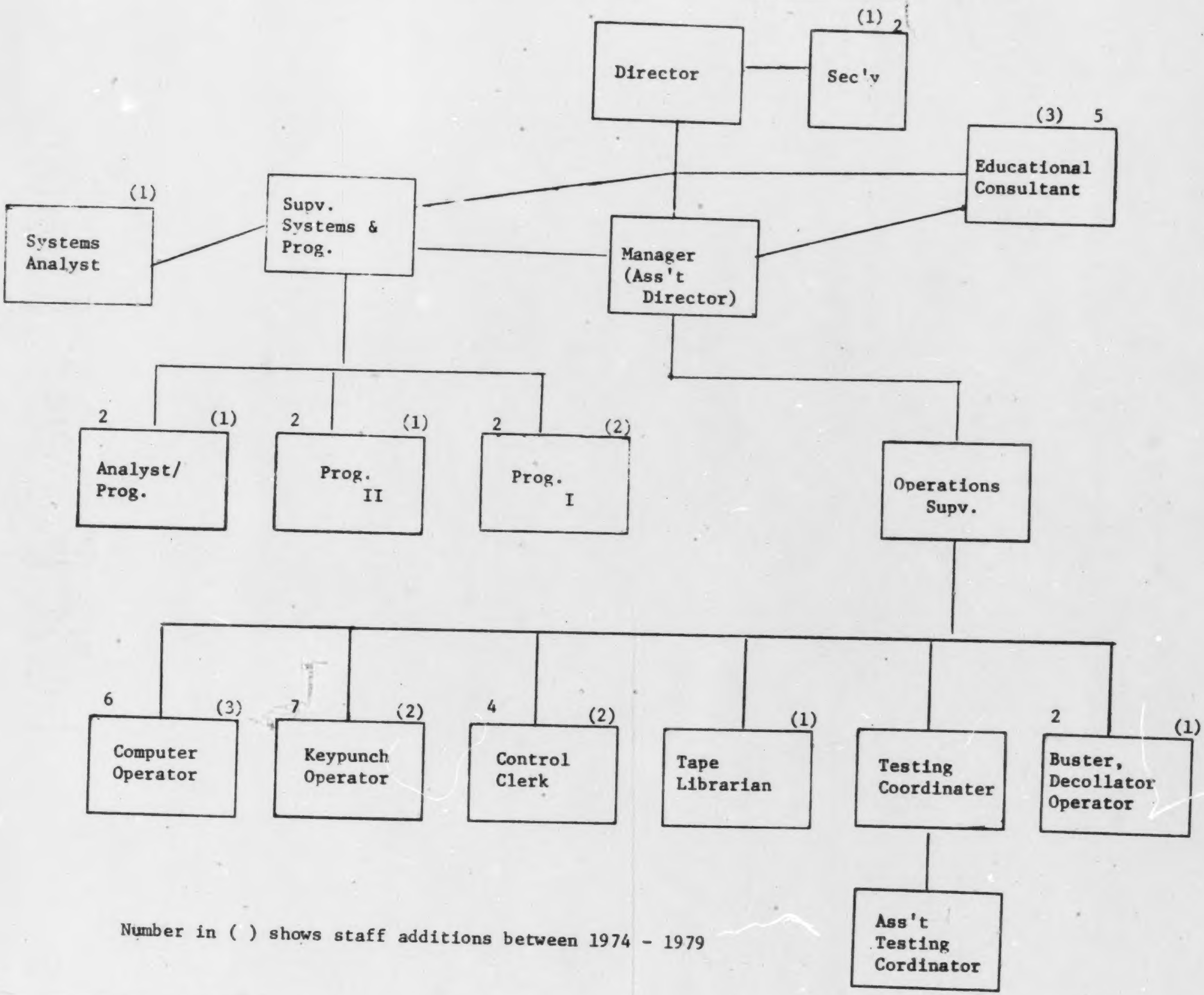
FIGURE 9

ALTERNATIVE #1 STAFFING - SACRAMENTO COUNTY REGIONAL CENTER


Director
(1) 2
Sec'y
(3) 5
Educational Consultant
(1)
Systems Analyst
Supv. Systems & Prog.
Manager (Ass't Director)
2 (1)
Analyst/ Prog.
2 (1)
Prog. II
2 (2)
Prog. I
Operations Supv.
6 (3)
Computer Operator
7 (2)
Keypunch Operator
4 (2)
Control Clerk
(1)
Tape Librarian
Testing Coordinater
2 (1)
Buster, Decollator Operator
Ass't Testing Cordinator

Number in ( ) shows staff additions between 1974 - 1979

20. Budget building and simulation
21. Inventory system (capital outlay and plant)
22. Transportation scheduling
23. Establishing tax rate and SB 90 computations
24. Facility planning
25. Salary projection for teacher negotiation
26. Self-insuring (joint sharing of liability among all districts in the County)
27. Data base of educational legislation and status updates to education code.

Figure 9 shows staff organization for 1979.

San Juan Unified School District

San Juan has recently acquired a new computer and is in the midst of converting programs. They separated their long-range data processing goals into three groups:

1. Those which can be accomplished at no additional cost
2. Those which will require one additional programmer (indicated by *)
3. Those which will require one and one-half programmers plus additional equipment for teleprocessing (indicated by **)

The applications which compose those long-range goals are:

1. Payroll/personnel data base (with budget and position control)

**2. On-line budget data base with complete encumbrance system

*3. Student data base

   a. Pupil tracking
   b. Cumulative grade reporting
   c. Suspension file
   d. Attendance

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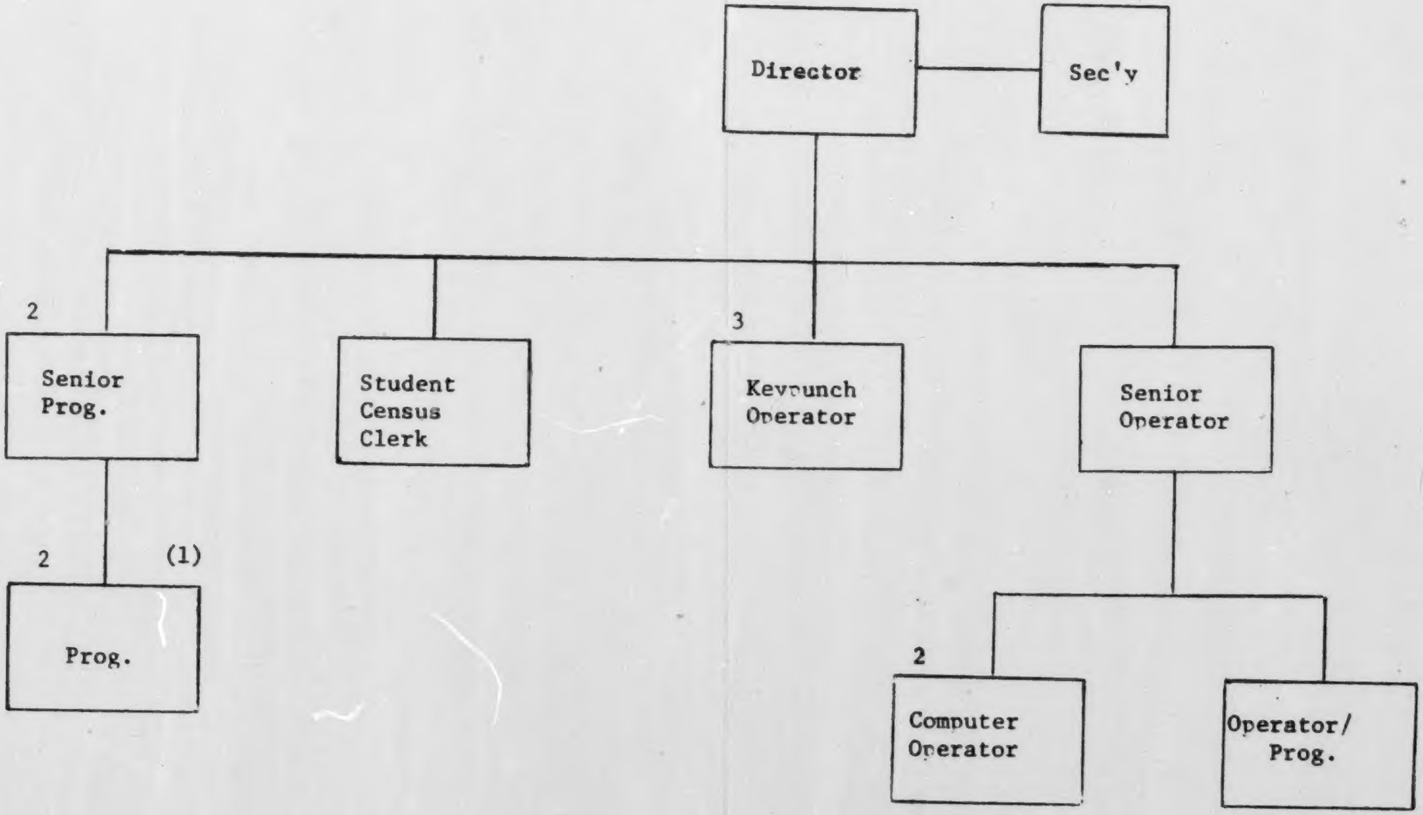
FIGURE 10

ALTERNATIVE #1 STAFFING
SAN JUAN UNIFIED SCHOOL DISTRICT


Director
Sec'y
2
Senior Prog.
Student Census Clerk
3
Keypunch Operator
Senior Operator
2
(1)
Prog.
2
Computer Operator
Operator/ Prog.

Number in ( ) shows staff additions between 1974 - 1979

4. Individualization of instruction
    a. Teacher/learning process
    b. Criterion reference testing (teacher-made test data base)
    **c. Diagnosis
    **d. Prescription

*5. Long-range projection of enrollments, revenues and expenditures with simulation capabilities

**6. On-line guidance, counseling and career exploration

7. Program accounting

8. Educational resources data base (personnel and materials).

Figure 10 shows staff organization for 1979.

Personnel

The matrix on the following page (Figure 11) illustrates the total staffing projected for 1970 by agency and position. Appendix E contains job descriptions for the positions discussed throughout this report.

Hardware

Equipment changes were discussed under each agency heading for this alternative. The costs which appear in Figure 12 are based on the average one-year lease price of five vendors for new equipment and present costs by agency for all equipment to be retained.

Applications

Alternative No. 1 allows each agency to develop its own applications. As a result, each agency maintains complete control of its applications and direction. There need be no changes in agency procedure or coding schemes.

Cost Allocation

All costs are paid by each agency as all activities in this alternative are decentralized. The total data processing costs for the five agencies appear in Figure 12.

FIGURE 11

STAFFING (1979) ALTERNATIVE NO. 1

	TOTAL	GRANT	LOS RIOS	SAC CITY	SAC COUNTY	SAN JUAN
D.P. DIRECTOR/MANAGER	5 1/2	1/2	1	1	2	1
EDUCATIONAL CONSULTANT	6			1	5	
SYSTEMS ANALYST	4		3		1	
SUPV SYSTEMS AND PROGRAMMING	2			1	1	
SENIOR PROGRAMMER/PROG II/SR. PROG/ANALYST	10		2	2	4	2
PROGRAMMER I/PROG/ANALYST	11	1	3	3	2	2
OPERATIONS SUPV	3		1	1	1	
OPERATOR (I AND II)	17	1	2	5	6	3
PROGRAMMER/OPERATOR	1					1
SUPV KEYPUNCH	2			1	1	
KEYPUNCH OPERATOR (I AND II)	20	2	3	5	7	3
DATA CONTROL CLERK (INCLUDING SUPERVISOR)	8		1	3	4	
SECRETARY/CLERICAL STAFF	5		1		2	2
TEST COORDINATOR	2				2	
BURSTER, DECOLLATOR OPERATOR	2				2	
TAPE LIBRARIAN	1				1	
DATA BASE ADMINISTRATOR	1		1			
TOTAL STAFF	100 1/2	4 1/2	18	23	41	14

Standardization

No standardization is required since each agency is responsible for maintaining its own standards. Each agency runs its own applications on its own equipment.

Figure 12
ALTERNATIVE NO. 1 – RECURRING COSTS

Personnel*	$ 1,827,700
Equipment computer	461,546
Equipment unit record	28,842
Equipment data entry	42,470
Equipment test scoring	42,460
Building rental	24,300
Utilities	600
Supplies	40,000
Travel and conventions	250
Miscellaneous	525
	$ 2,468,873

* Based on 1979-80 school year assuming 5% inflation, includes all fringe benefits.

See Appendix K for estimated costs by agency.

INTRODUCTION TO ALTERNATIVE NOS. 2 – 6

The following alternatives are presented in a format corresponding to:

- Basic alternative description
- Narrative description
  - Batch system
  - RJE system
  - Mini system
- Hardware description
- Staffing charts
- Applications

- Organization and administration
- Cost allocation
- Standardization
- Implementation plan
- Costs.

ALTERNATIVE NO. 2

- Central hardware
- Central systems and programming staff
- Common applications

Batch

This alternative represents "total consolidation." All computer equipment would be located at a central site. Data would be delivered to the central site and the reports later returned to the individual agencies. With the exception of an agency coordinator and data entry staff for each agency, all data processing staff would be housed at the central site. (This includes control clerks, computer operators, programmers, systems analysts, the data center director and administrative support staff.) However, based on our experience, we feel that data entry staff should be located as close to the user as possible. All applications would be consolidated into a series of centrally developed common systems. In this way, most of the files could be shared, thus yielding a cost-effective utilization of time and equipment.

The users would establish a steering committee (with each agency having representation) that would set the policy and priorities for the central activities. Additionally, an application review (technical) committee would be established to ensure that the unique needs of each agency are not overlooked in the central development of common applications.

RJE

RJE means Remote Job Entry. Alternative No. 2 can have a variation where an RJE station is located in each agency. An RJE station consists of a data reader and a printer which send and receive information over high speed communications lines from a central computer which performs the actual processing. Thus, it would appear as if each agency had immediate access to an on-site computer.

The addition of the RJE station to Alternative No. 2 has little effect on the staffing and the applications. The primary advantage of RJE is improved turnaround time. An operator would be required at each RJE station and data control personnel would be located at each agency instead of the central site.

Mini

The term "mini" is an abbreviation for minicomputer. A minicomputer may have its own printer, card reader, disk drives, tape drives, memory and arithmetic-logic capability. This "mini" can be used as a Remote Job Entry (RJE) station communicating with a larger central computer. Since a minicomputer can be programmed to do independent processing or edit data being sent or received by the central system, it would be necessary to have a programmer at each "mini" site. This programmer could function as a programmer/operator depending on the amount of processing performed on the minicomputer. It is possible that certain minor applications could be performed in their entirety on the "mini."

Central Hardware

Batch (see Figure 13):

CPU	500K (relocatable memory)
Disk	600 million (at least 6 spindles)
Tape	4 tape drives (at least 250 KBS)
Card reader	1000 CPM
Card punch	300 CPM
Printer	1000 LPM each (3 printers)

RJE:

One central printer
Central card reader can be slower
RJE print speed ranges from 300 LPM at Grant to 600 LPM at Sacramento City
RJE card read speed 300-500 CPM

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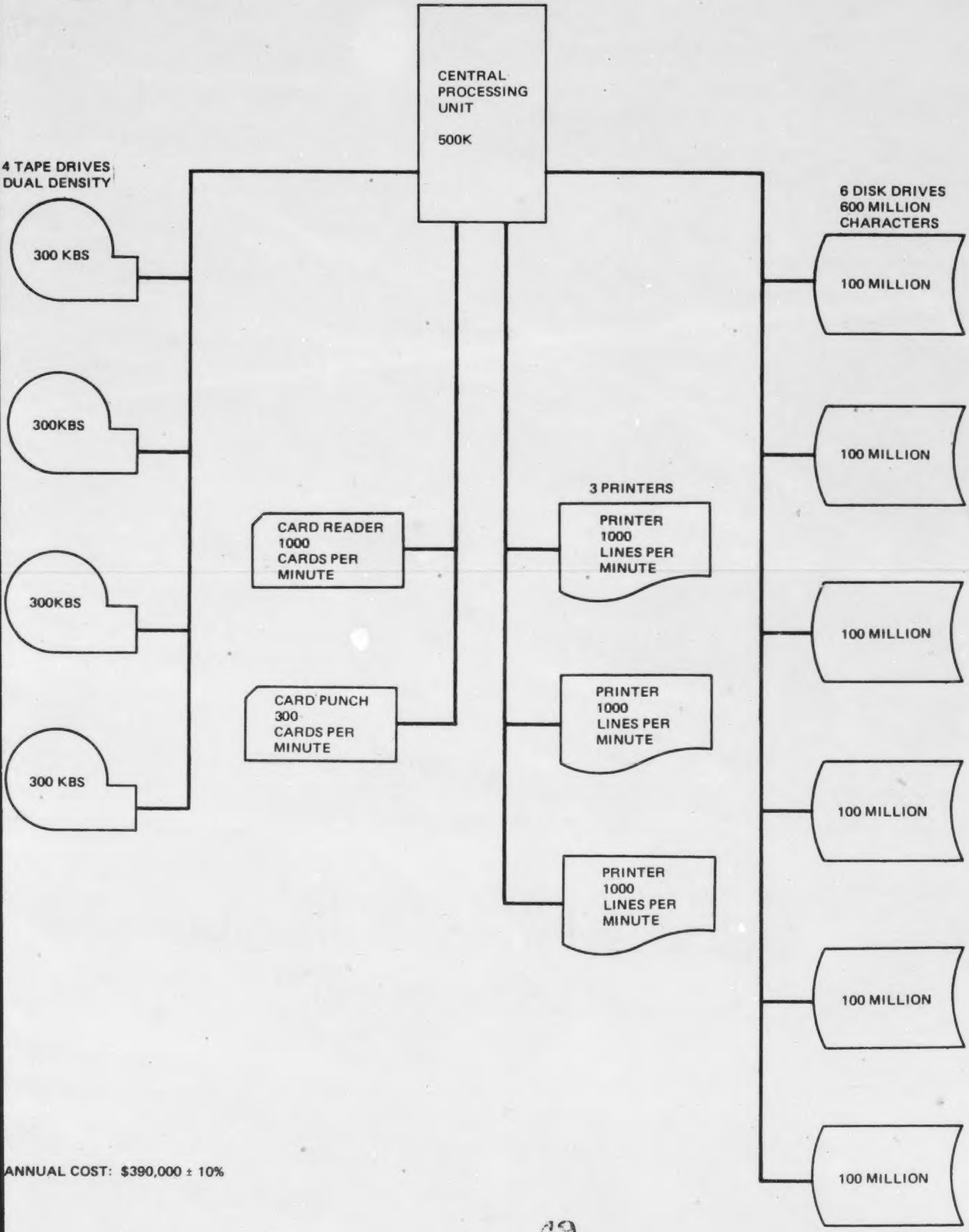
FIGURE 13

HARDWARE CONFIGURATION


CENTRAL PROCESSING UNIT
500K
4 TAPE DRIVES DUAL DENSITY
300 KBS
300KBS
300KBS
300 KBS
CARD READER 1000 CARDS PER MINUTE
CARD PUNCH 300 CARDS PER MINUTE
3 PRINTERS
PRINTER 1000 LINES PER MINUTE
PRINTER 1000 LINES PER MINUTE
PRINTER 1000 LINES PER MINUTE
6 DISK DRIVES 600 MILLION CHARACTERS
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION

ANNUAL COST: $390,000 ± 10%

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ALTERATIVE #2
CENTRAL STAFF (BATCH)

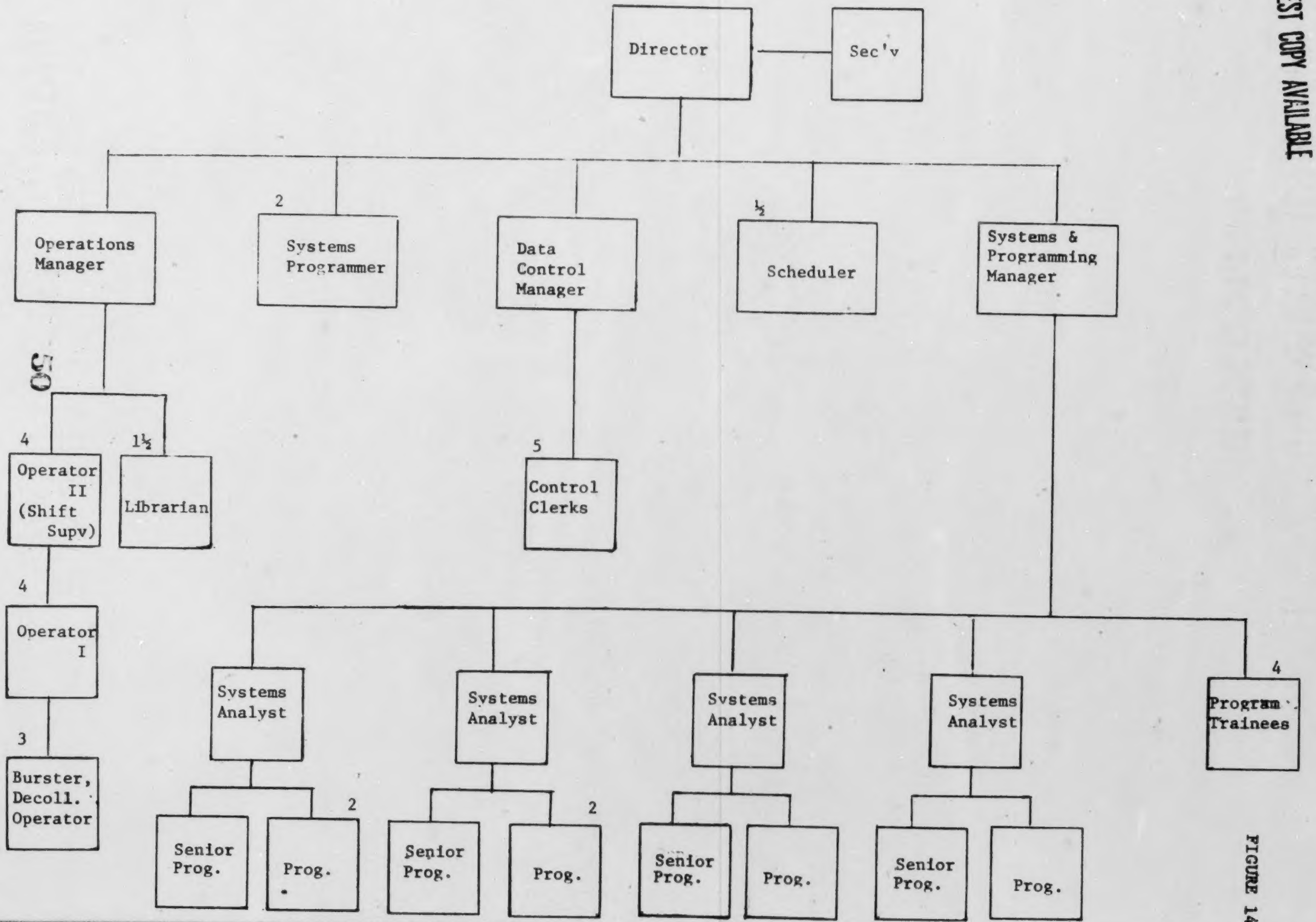
Director
Sec'v
Operations Manager
2
Systems Programmer
Data Control Manager
½
Scheduler
Systems & Programming Manager
4
Operator II (Shift Supv)
1½
Librarian
5
Control Clerks
4
Operator I
3
Burster, Decoll. Operator
Systems Analyst
Senior Prog.
2
Prog.
Systems Analyst
Senior Prog.
2
Prog.
Systems Analyst
Senior Prog.
Prog.
Systems Analyst
Senior Prog.
Prog.
4
Program Trainees

FIGURE 14

Mini:
- Same central hardware as RJE
- Mini CPU 16K to 32K (varies with agency)
- Mini disk capacity 2.5 to 10 million bytes (based on agency and applications)
- Mini read/print speeds same as RJE

This alternative requires an operating system capable of running at least three partitions in the batch environment, and five partitions in the mini/RJE environment including a remote spooling program. The operating system must be able to dynamically reallocate memory based on need and usage within each program and partition. The common programs would be designed so that they could run in a 100K relocatable partition.

Alternative No. 2 – Batch
Staffing at Central Facility (1979)

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 45,738	$ 45,738
Manager, systems and programming	1	38,115	38,115
Manager, operations	1	33,541	33,541
Scheduler	0.5	22,868	11,434
Systems programmer	2	28,205	56,410
Systems analyst	4	27,442	109,768
Senior programmer	4	25,918	103,672
Programmer	6	23,631	141,786
Programmer trainee	4	18,295	73,180
Burster, decollator operator	3	14,036	42,108
Librarian	1.5	13,552	20,328
Operator II (shift supervisor)	4	16,766	67,064
Operator I	4	15,271	61,084
Secretary to director	1	15,125	15,125
Data control manager	1	14,228	14,228
Data control clerk	5	11,828	59,140
Total	43		$ 892,721

Appendix J is a comparison of the personnel positions available under each alternative.

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ALTERNATIVE #2 W/ RJE OR MINI
CENTRAL STAFF

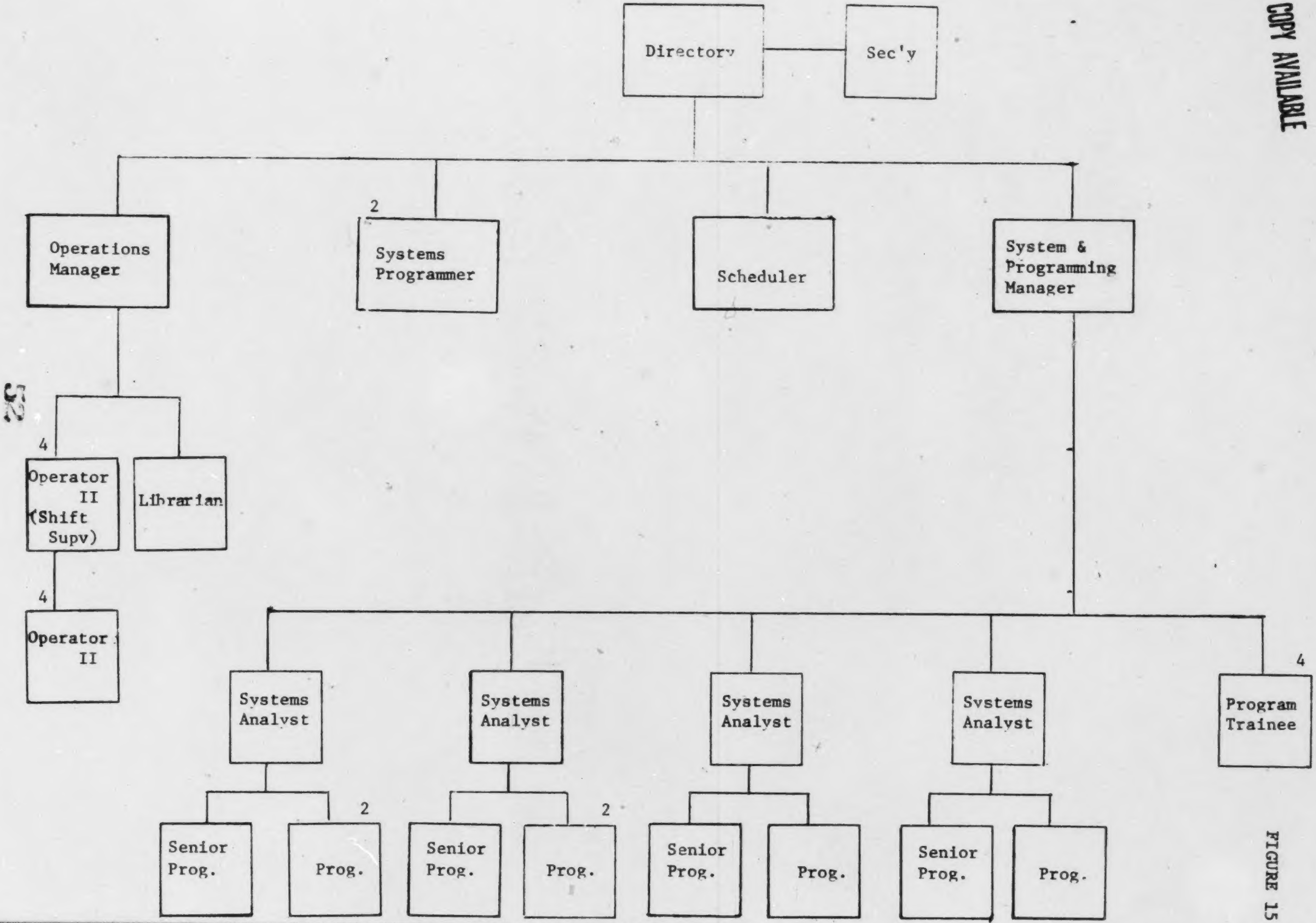
Directory
Sec'y
Operations Manager
2
Systems Programmer
Scheduler
System & Programming Manager
4
Operator II (Shift Supv)
Librarian
4
Operator II
Systems Analyst
Systems Analyst
Systems Analyst
Systems Analyst
4
Program Trainee
Senior Prog.
2
Prog.
Senior Prog.
2
Prog.
Senior Prog.
Prog.
Senior Prog.
Prog.

FIGURE 15

Alternative No. 2 – RJE or Mini
Staffing at Central Facility (1979)

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 45,738	$ 45,738
Manager, systems and programming	1	38,115	38,115
Manager, operations	1	33,541	33,541
Scheduler	0.5	22,868	11,434
Systems programmer	2	28,205	56,410
Systems analyst	4	27,442	109,768
Senior programmer	4	25,918	103,672
Programmer	6	23,631	141,786
Programmer trainee	4	18,295	73,180
Librarian	1.5	13,552	20,328
Operator II (shift supervisor)	4	16,766	67,064
Operator I	4	15,271	61,084
Secretary to director	1	15,125	15,125
Total	34		$ 777,245

Applications

A fundamental aspect of Alternative No. 2 is application consolidation. The cooperative effort that results in common applications will create a system that has:

- Common basis of communication
- Simplified interagency record transfer
- All applications available to all agencies
- Common chart of accounts
- Common student identification numbers
- Common position codes
- Great variety of applications available.

See Appendix B for a discussion of potential common applications.

STAFFING AT EACH AGENCY (1979)
ALTERNATIVE NO. 2

	TOTAL STAFF	GRANT	LOS RIOS	SAC CITY	SAC COUNTY	SAN JUAN	TOTAL COST FOR POSITIONS ①
AGENCY COORDINATOR	4 1/2	1/2	1	1	1	1	$152,832
EDUCATIONAL CONSULTANT	6			1	5		173,491
TEST ADMINISTRATOR	2				2		31,883
KEYPUNCH	22	2	3	6②	8②	3	257,859
TOTAL	34 1/2	2 1/2	4	8	16	4	616,065
w/ RJE							
OPERATOR II	8 1/2	1/2	2	2	2	2	131,121
DATA CONTROL	8 1/2		1	3②	4	1/2	96,162
TOTAL	51 1/2	3	7	13	22	6 1/2	843,348
w/ MINI COMPUTER							
PROGRAMMER	4		1	1	1	1	80,889
TOTAL	55 1/2	3	8	14	23	7 1/2	$924,237

① BASED ON 1979 PROJECTION, 5% PER YEAR SALARY INCREASE ALL FRINGE BENEFITS INCLUDED

② INCLUDES ONE SUPERVISOR

Organization and Administration

The central data center is administered by a director who reports to a steering committee which sets policy. User needs and feedback are conveyed to the director through a technical committee made up of the agency data processing coordinators. For details, see Appendix H.

Cost Allocation

Cost allocation is set by the steering committee based on utilization of programs, equipment, and personnel. For details, see Appendix I.

Data Entry Standardization

Although this alternative deals with total consolidation and common systems, data entry is still a user function. Therefore, data entry is located at each agency. For data to interface with the common programs, there must be strict adherence to standards set by the central programming staff. Enforcement of standards is a prerequisite for effective operations.

If a minicomputer is used as an RJE station, the agency has some flexibility in data entry. The minicomputer can be programmed to edit and reformat all data to conform to central standards even though it is prepared under seemingly incompatible agency standards.

Systems Design and Programming Standardization

All design and programming is standardized as all programs are shared. This is easily enforced as the systems and programming staff is a part of the central data center and are all supervised by the same manager. There may be optional features in programs. Those optional features are programmed by the same central staff which developed the original basic program. Therefore, they will share the same standards.

Implementation Plan

Hardware procurement	9 months
Staff training	12 months
General systems design	4 months
Detail design	11.5 months
Implementation	10.5 months
Evaluation	2 months
Total elapsed time	3 years 6 months

Graphic depictions of the implementation plan mentioned above are found in Figures 16 and 17. A detailed explanation is contained in Appendix F.

Alternative No. 2 – One-time Costs

Disk packs (purchase)	$ 35,000
Shipping	8,000
Site preparation	40,000
Education	35,000
Contract common chart of accounts	10,000
Supplemental development personnel	85,000
Miscellaneous	10,000
Total cost	223,000
Less sale of present equipment	325,000
Net cost	$ (102,000)

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FIGURE 16

IMPLEMENTATION – ALTERNATIVE 2

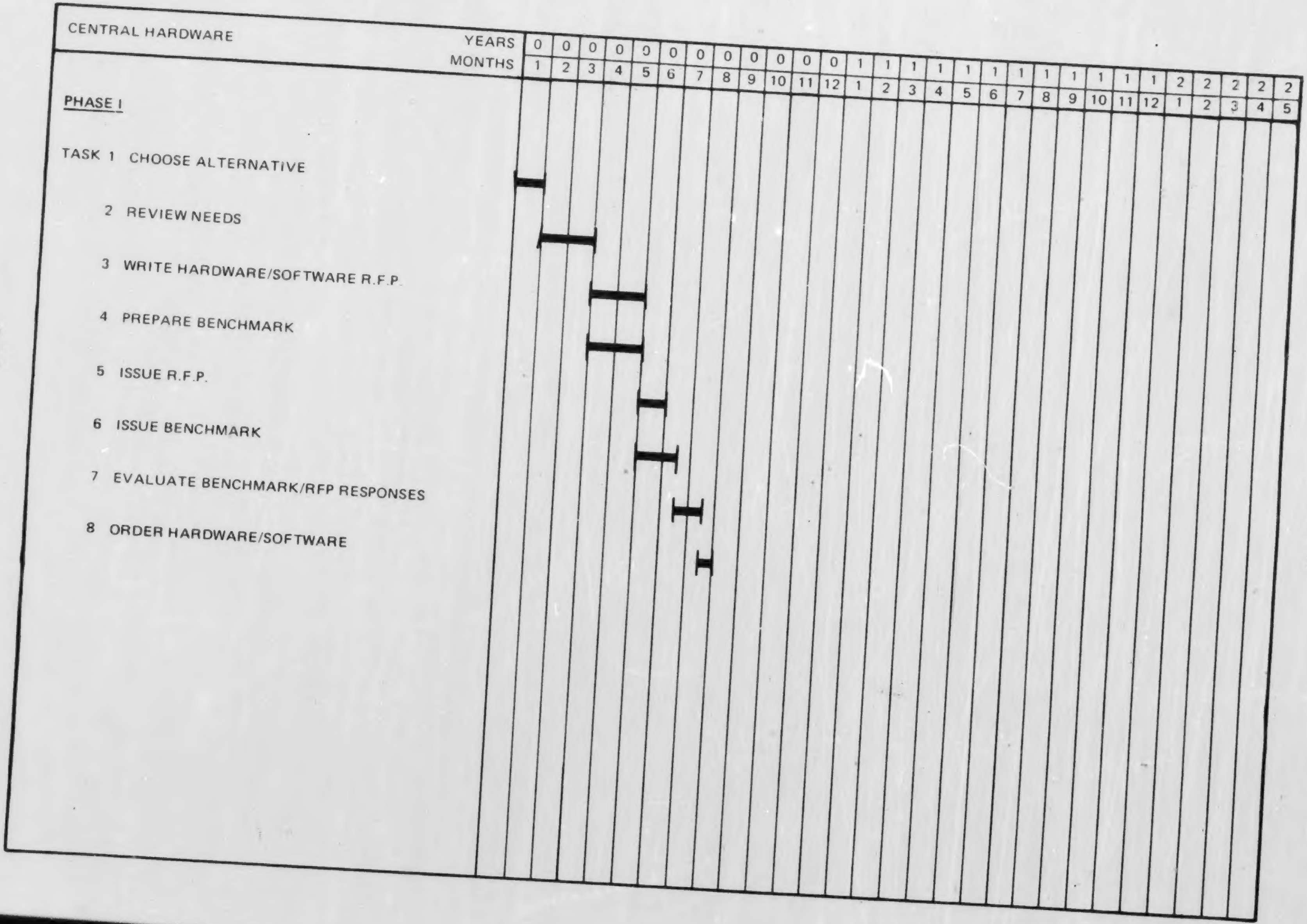

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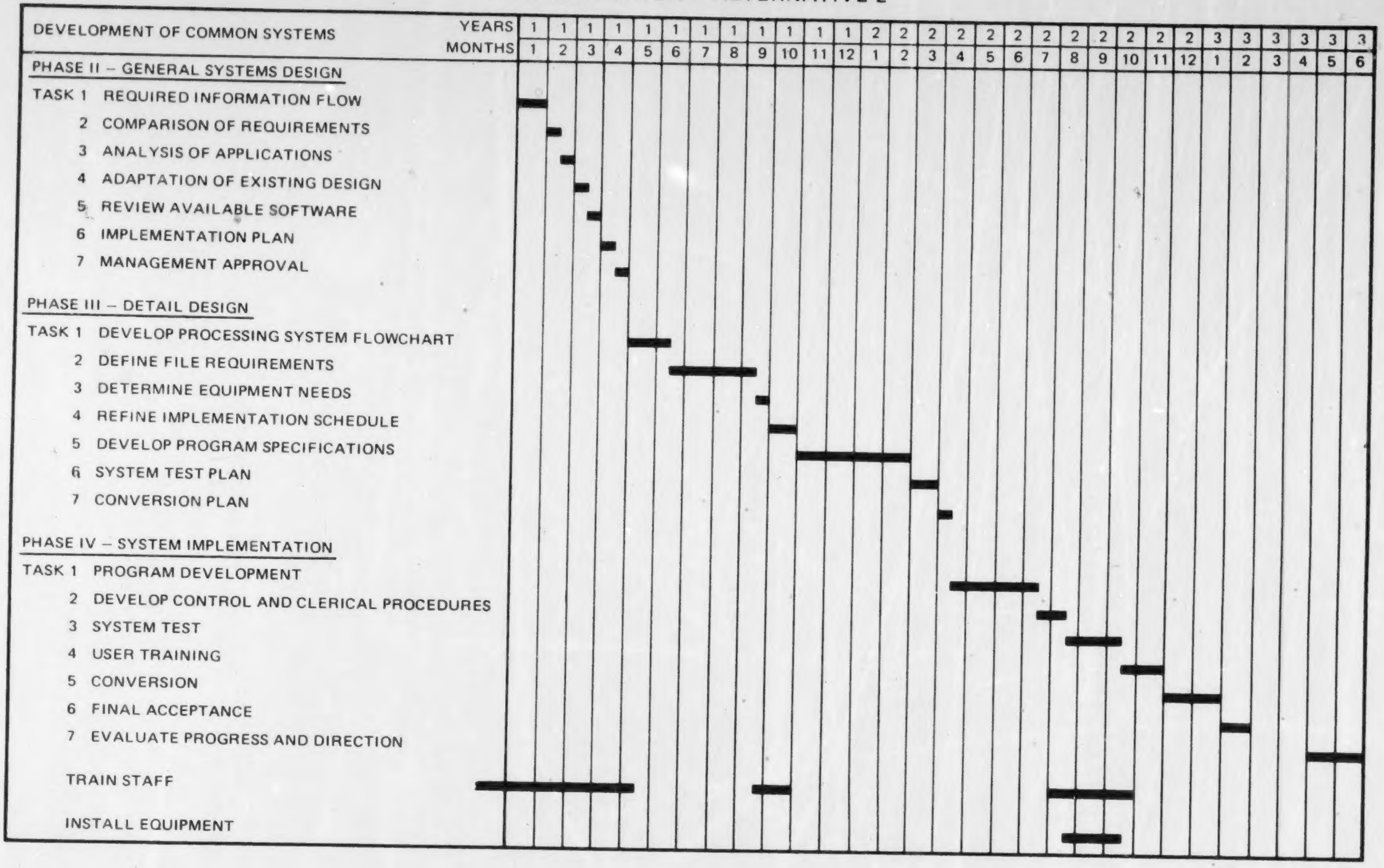
FIGURE 17

IMPLEMENTATION – ALTERNATIVE 2



Alternative No. 2 – Recurring Costs

Personnel (1)	$ 1,508,786
Equipment computer	390,000 ± 10%
Equipment unit record	5,000
Equipment data entry	42,470
Equipment test scoring	35,000
Building rental	52,800
Utilities	5,000
Supplies	40,000
Ongoing education	10,000
Travel and conventions	2,000
Miscellaneous	5,000
Batch	$ 2,096,056
Remote Job Entry (2)	$ 2,342,198
Minicomputer (2)	2,495,498

(1) Based on 1979-80 school year assuming 5% inflation, includes all fringe benefits.

(2) Includes line and modem costs.

ALTERNATIVE NO. 3

- Central hardware
- Central systems and programming staff
- Separate applications

The computer equipment and staffing of this alternative are similar in design to Alternative No. 2. (Equipment and hardware are consolidated into a central site.) Within the central site, the central staff would develop and maintain separate files and applications for each agency. This approach would provide a common set of programming standards for all agencies, while allowing complete individuality of each application.

A steering committee would set general policy for the central system, with each agency having final approval in the design, implementation and maintenance of their separate applications.

RJE

RJE means Remote Job Entry. Alternative No. 3 (which has a centralized computer) can have a variation where an RJE station is located in each agency. An RJE station consists of a data reader and a printer which send and receive information over high speed communications lines from a central computer which performs the actual processing. Thus, it would appear as if each agency had immediate access to an on-site computer.

The addition of the RJE station to Alternative No. 3 has little effect on the staffing and the applications. The primary advantage of RJE is improved turnaround time. An operator would be required at each RJE station and data control personnel would be located at each agency instead of the central site.

Mini

The term "mini" is an abbreviation for minicomputer. A minicomputer may have its own printer, card reader, disk drives, tape drives, memory and arithmetic-logic capability. This "mini" can be used as a Remote Job Entry (RJE) station communicating with a larger central computer. Since a minicomputer can be programmed to do independent processing or edit data being sent or received by the central system, it would be necessary to have a programmer at each "mini" site. This programmer could function as a programmer/operator depending on the amount of processing performed on the minicomputer. It is possible that certain minor applications could be performed in their entirety on the "mini."

Central Hardware – Separate Applications

Batch (see Figure 18):

CPU	1000K (relocatable memory)
Disk	800 million bytes (at least 8 spindles)
Tape	8 tape drives (at least 300 KBS)
Card reader	1000 CPM
Card punch	300 CPM
Printer	1000 LPM each (3 printers)

RJE:

- One central printer
- Central card reader can be slower
- RJE print speed ranges from 300 LPM at Grant to 600 LPM at Sacramento City
- RJE card read speed 300-500 CPM

FIGURE 18
HARDWARE CONFIGURATION

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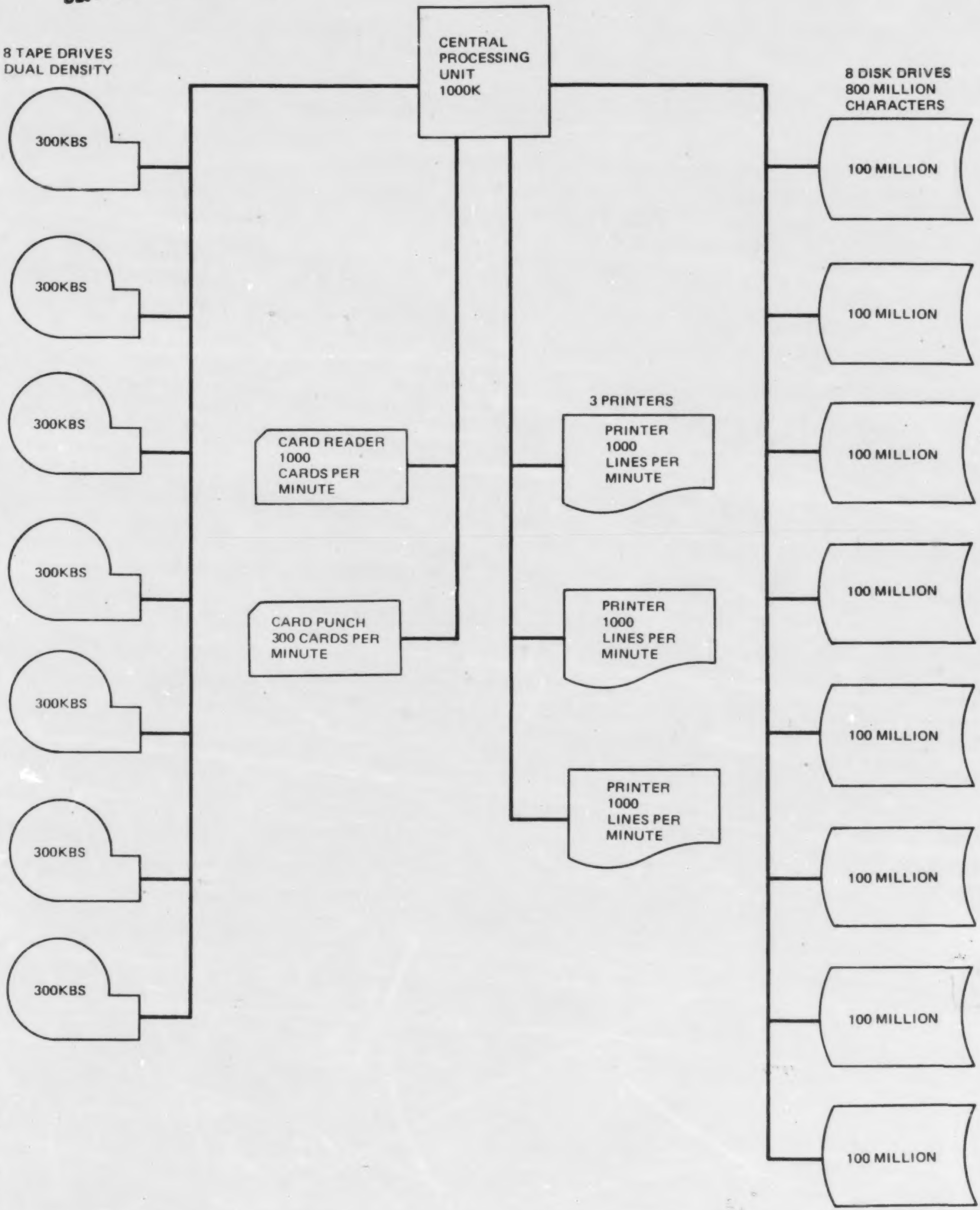
8 TAPE DRIVES
DUAL DENSITY
300KBS
300KBS
300KBS
300KBS
300KBS
300KBS
300KBS
300KBS
CENTRAL PROCESSING UNIT 1000K
CARD READER 1000 CARDS PER MINUTE
CARD PUNCH 300 CARDS PER MINUTE
3 PRINTERS
PRINTER 1000 LINES PER MINUTE
PRINTER 1000 LINES PER MINUTE
PRINTER 1000 LINES PER MINUTE
8 DISK DRIVES
800 MILLION
CHARACTERS
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION

NUAL COST: $485,000 ± 10%

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ALTERNATIVE #3 - CENTRAL STAFF (BATCH)

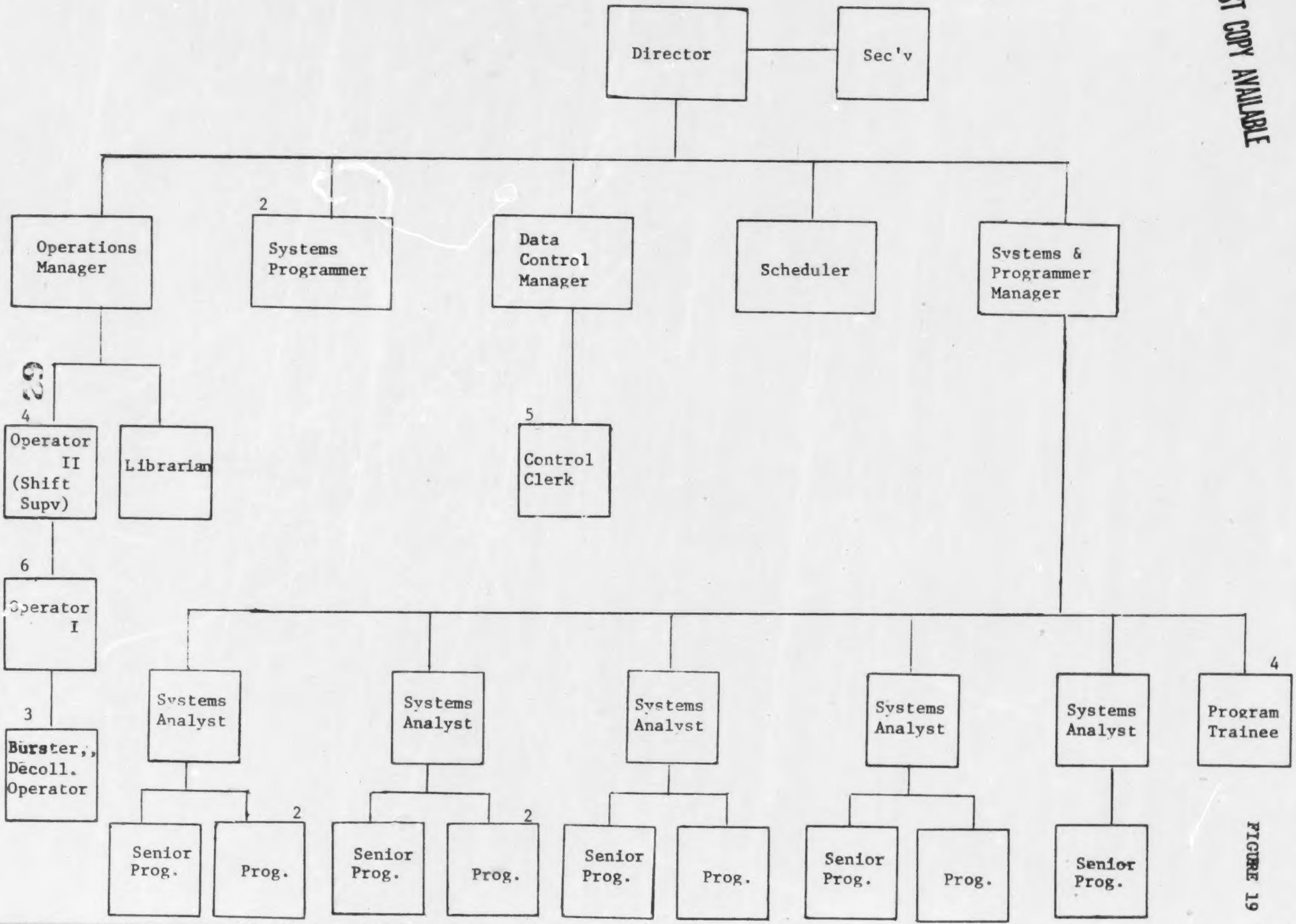
Director
Sec'v
Operations Manager
2
Systems Programmer
Data Control Manager
Scheduler
Systems & Programmer Manager
4
Operator II (Shift Supv)
Librarian
5
Control Clerk
6
Operator I
3
Burster, Decoll. Operator
Systems Analyst
Senior Prog.
2
Prog.
Systems Analyst
Senior Prog.
2
Prog.
Systems Analyst
Senior Prog.
Prog.
Systems Analyst
Senior Prog.
Prog.
Systems Analyst
Senior Prog.
4
Program Trainee

FIGURE 19

Mini:
Same central hardware as RJE
Mini CPU 16K to 32K (varies with agency)
Mini disk capacity 2.5 to 10 million bytes (based on agency and applications)
Mini read/print speeds same as RJE

This alternative requires an operating system capable of running five to seven partitions including a spooling program (for both batch and RJE). The operating system must be able to dynamically reallocate memory based on need and usage within each partition. Each agency would be allocated a 100K relocatable partition.

Alternative No. 3 – Batch
Staffing at Central Facility

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 45,738	$ 45,738
Manager, systems and programming	1	38,115	38,115
Manager, operations	1	33,541	33,541
Scheduler	1	22,868	22,868
Systems programmer	2	28,205	56,410
Systems analyst	5	27,442	137,210
Senior programmer	5	25,918	129,590
Programmer	6	23,631	141,786
Programmer trainee	4	18,295	73,180
Librarian	1	13,552	13,552
Operator II (shift supervisor)	4	16,766	67,064
Operator I	6	15,271	91,626
Secretary to director	1	15,125	15,125
Decollator, burster operator	3	14,036	42,108
Data control manager	1	14,228	14,228
Control clerk	5	11,828	59,140
Total	47		$ 981,281

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ALTERNATIVE #3 W/ RJE or MINI CENTRAL STAFF

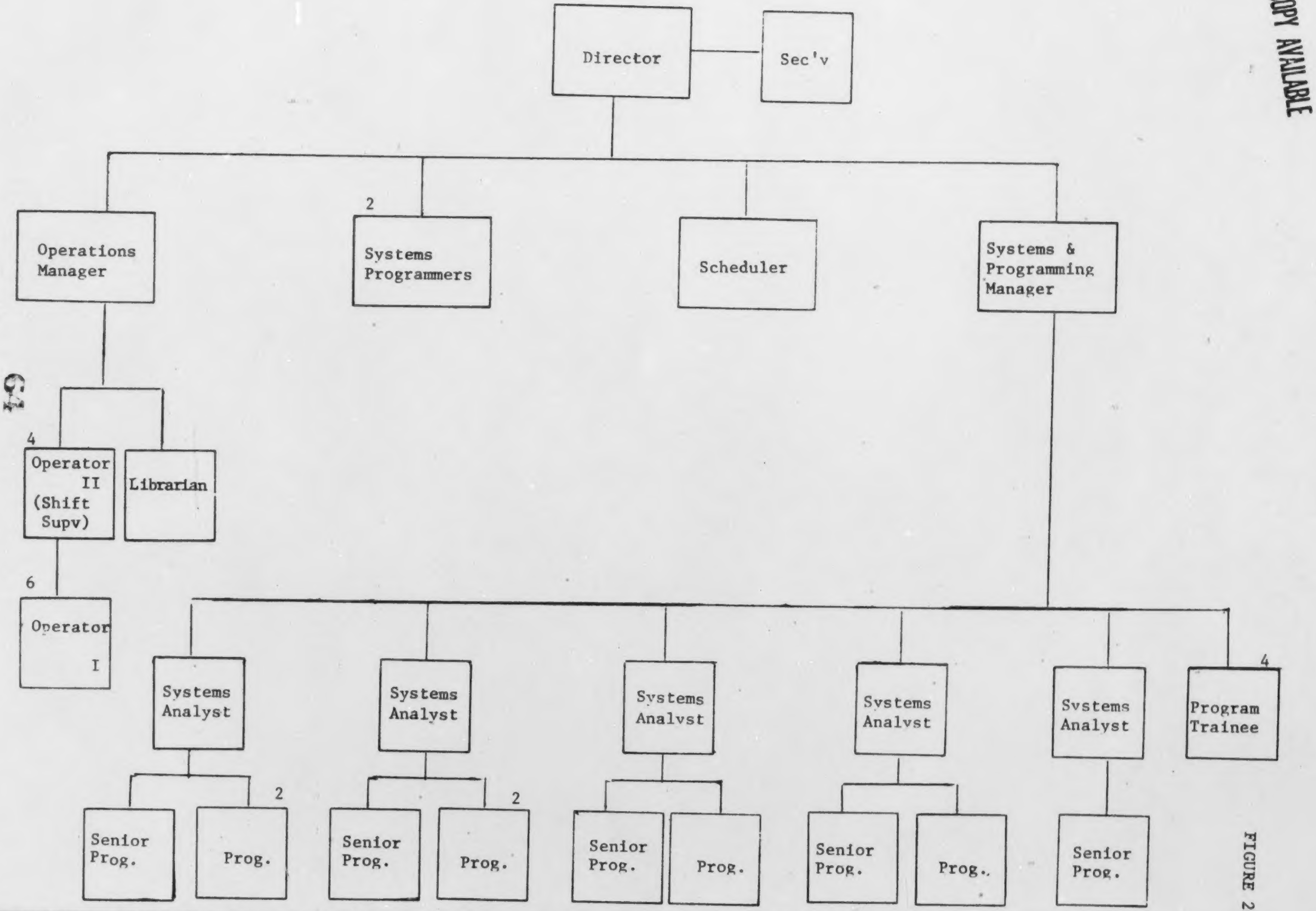
Director
Sec'v
Operations Manager
2
Systems Programmers
Scheduler
Systems & Programming Manager
4
Operator II (Shift Supv)
Librarian
6
Operator I
Systems Analyst
Systems Analyst
Systems Analyst
Systems Analyst
Systems Analyst
4
Program Trainee
Senior Prog.
2
Prog.
Senior Prog.
2
Prog.
Senior Prog.
Prog.
Senior Prog.
Prog.
Senior Prog.

FIGURE 20

Alternative No. 3 – RJE or Mini
Staffing at Central Facility

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 45,738	$ 45,738
Manager, systems and programming	1	38,115	38,115
Manager, operations	1	33,541	33,541
Scheduler	1	22,868	22,868
Systems programmer	2	28,205	56,410
Systems analyst	5	27,442	137,210
Senior programmer	5	25,918	129,590
Programmer	6	23,631	141,786
Programmer trainee	4	18,295	73,180
Librarian	1	13,552	13,552
Operator II (shift supervisor)	4	16,766	67,064
Operator I	6	15,271	91,626
Secretary to director	1	15,125	15,125
Total	38		$ 865,805

Applications

Under this alternative, each agency continues to use its separate applications. Thus, each agency sets its own priorities and direction and each maintains control of its own applications. No changes need be made in agency procedure or coding schemes.

Organization and Administration

The central data center is administered by a director who reports to a steering committee which sets policy. User needs and feedback are conveyed to the director through a technical committee made up of the agency data processing coordinators. For details, see Appendix H.

Cost Allocation

Cost allocation is set by the steering committee based on utilization of programs, equipment and personnel. For details see Appendix I.

STAFFING AT EACH AGENCY (1979)
ALTERNATIVE NO. 3

	TOTAL STAFF	GRANT	LOS RIOS	SAC CITY	SAC COUNTY	SAN JUAN	TOTAL COST FOR POSITIONS ①
AGENCY COORDINATOR	4 1/2	1/2	1	1	1	1	$152,832
EDUCATIONAL CONSULTANT	6			1	5		173,491
TEST ADMINISTRATOR	2				2		31,883
KEYPUNCH	22	2	3	6②	8②	3	257,859
TOTAL	34 1/2	2 1/2	4	8	16	4	616,065
w/ RJE							
OPERATOR II	8 1/2	1/2	2	2	2	2	131,121
DATA CONTROL	8 1/2		1	3②	4	1/2	96,162
TOTAL	51 1/2	3	7	13	22	6 1/2	843,348
w/ MINI COMPUTER							
PROGRAMMER	4		1	1	1	1	80,889
TOTAL	55 1/2	3	8	14	23	7 1/2	$924,237

① BASED ON 1979 PROJECTION, 5% PER YEAR SALARY INCREASE ALL FRINGE BENEFITS INCLUDED

② INCLUDES ONE SUPERVISOR

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IMPLEMENTATION – ALTERNATIVE 3

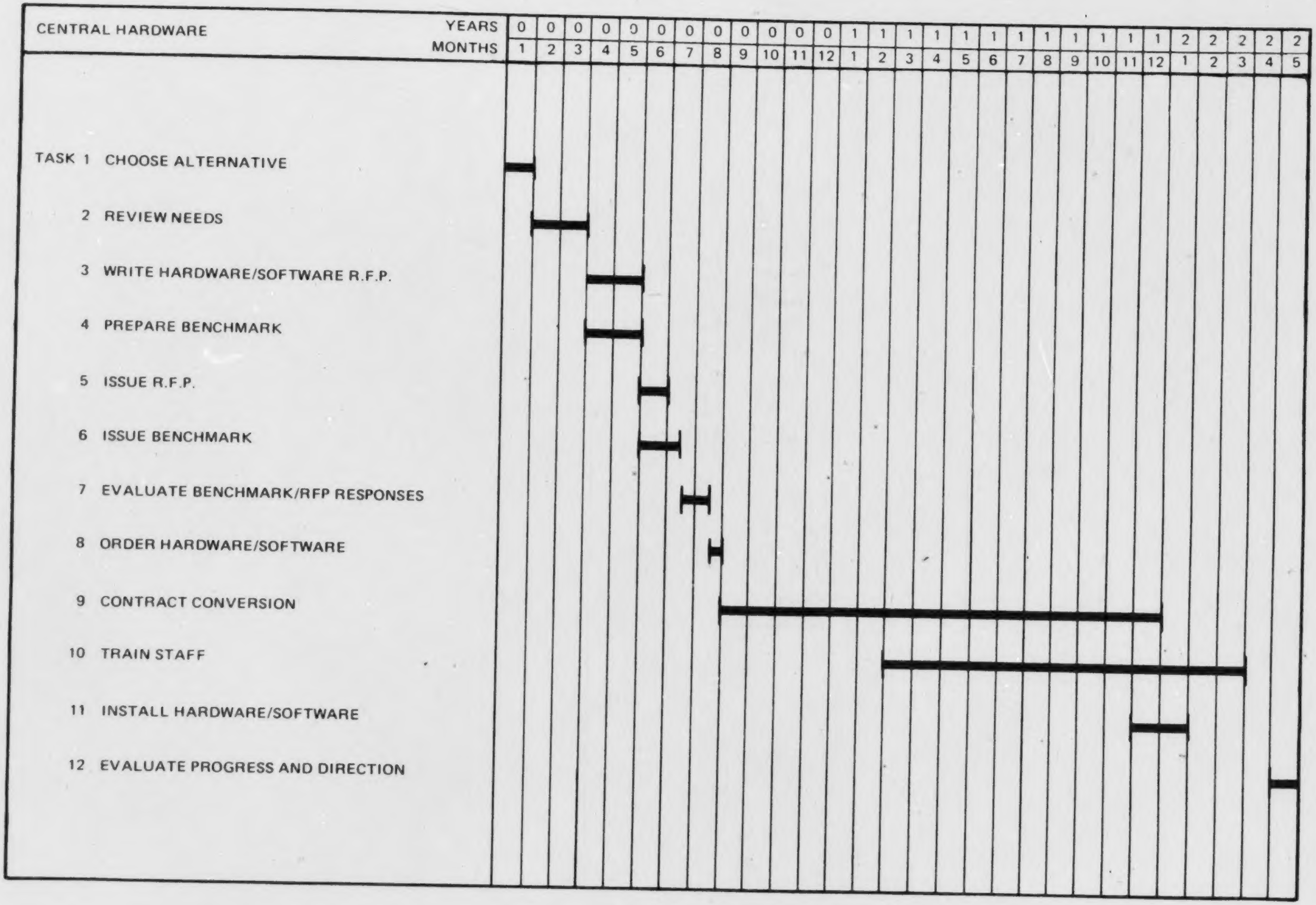

FIGURE 21

Data Entry Standardization

Data entry is located at each agency. The standards need only conform to the needs of each agency as each agency has separate application programs. Therefore, there are no central standards other than those which may be imposed by hardware restraints e.g., keypunching 96-column cards when the central center only has an 80-column card reader would create the need for a hardware-imposed standard. A hardware-imposed standard is self-enforcing, since the hardware will not accept the data, and the agency which allowed incompatible data will ultimately suffer the consequences.

Systems Design and Programming Standardization

As each agency has its own separate programs, there is no need for any standardization other than that imposed by the hardware. However, since this alternative has a central systems and programming staff, applications programs will tend to move toward some form of standard.

A minicomputer being used as an RJE station may also act as an independent processor for some programs. Any standards for independently run programs would be the responsibility of the agency using them.

Implementation Plan

Hardware procurement	9 months
Contract conversion	16 months
Staff training	12 months
Implementation	2 months
Evaluation	1 month
Total elapsed time	2 years 5 months

A graphic depiction of the implementation plan mentioned above is found in Figure 21. A detailed explanation is contained in Appendix F.

Alternative No. 3 – One-time Costs

Disk packs	$ 40,000
Shipping	10,000
Site preparation	40,000
Education	25,000
Contract conversion	300,000
Miscellaneous	10,000
Total cost	425,000
Less sale of present equipment	325,000
Net cost	$ 100,000

Alternative No. 3 – Recurring Costs

Personnel (1)	$ 1,597,346
Equipment computer	485,000 ± 10%
Equipment unit record	5,000
Equipment data entry	42,470
Equipment test scoring	35,000
Building rental	54,780
Utilities	5,000
Supplies	40,000
Ongoing education	10,000
Travel and conventions	2,000
Miscellaneous	5,000
Batch	$ 2,281,596
Remote Job Entry (2)	$ 2,527,738
Minicomputer (2)	2,681,038

(1) Based on 1979-80 school year assuming 5% inflation, includes all fringe benefits.

(2) Includes line and modem costs.

ALTERNATIVE NO. 4

- Central hardware
- Separate systems and programming staff
- Separate applications

Batch

A single shared computer installation is the key point of centralization in this alternative (along with the appropriate centralized operations staff). Systems and programming staffs are located at each individual agency. Applications are developed and maintained entirely by each separate agency. Essentially, the central computer is a shared processor where each agency has an autonomous section (partition) in which to process their individual applications.

A steering committee would set operations policy and cost allocation.

RJE

RJE means Remote Job Entry. Alternative No. 4 can have a variation where an RJE station is located in each agency. An RJE station consists of a data reader and a printer which send and receive information over high speed communications lines from a central computer which performs the actual processing. Thus, it would appear as if each agency had immediate access to an on-site computer.

The addition of the RJE station to Alternative No. 4 has little effect on the staffing and the applications. The primary advantage of RJE is improved turnaround time. An operator would be required at each RJE station and data control personnel would be located at each agency instead of the central site.

Mini

The term "mini" is an abbreviation for minicomputer. A minicomputer may have its own printer, card reader, disk drives, tape drives, memory and arithmetic-logic capability. This "mini" can be used as a Remote Job Entry (RJE) station communicating with a larger central computer. Since a minicomputer can be programmed to do independent processing or edit data being sent or received by the central system, it would be necessary to have a programmer at each "mini" site. This programmer could function as a programmer/operator depending on the amount of processing performed on the minicomputer. It is possible that certain minor applications could be performed in their entirety on the "mini."

Central Hardware – Separate Applications

Batch (see Figure 22):

CPU	1000K (relocatable memory)
Disk	800 million bytes (at least 8 spindles)
Tape	8 tape drives (at least 300 KBS)
Card reader	1000 CPM
Card punch	300 CPM
Printer	1000 LPM each (3 printers)

RJE:
One central printer
Central card reader can be slower
RJE print speed ranges from 300 LPM at Grant to 600 LPM at Sacramento City
RJE card read speed 300-500 CPM

Mini:
Same central hardware as RJE
Mini CPU 16K to 32K (varies with agency)
Mini disk capacity 2.5 to 10 million bytes (based on agency and applications)
Mini read/print speeds same as RJE

This alternative requires an operating system capable of running five to seven partitions including a spooling program (for both batch and RJE). The operating system must be able to dynamically reallocate memory based on need and usage within each partition. Each agency would be allocated a 100K relocatable partition.

FIGURE 22
HARDWARE CONFIGURATION

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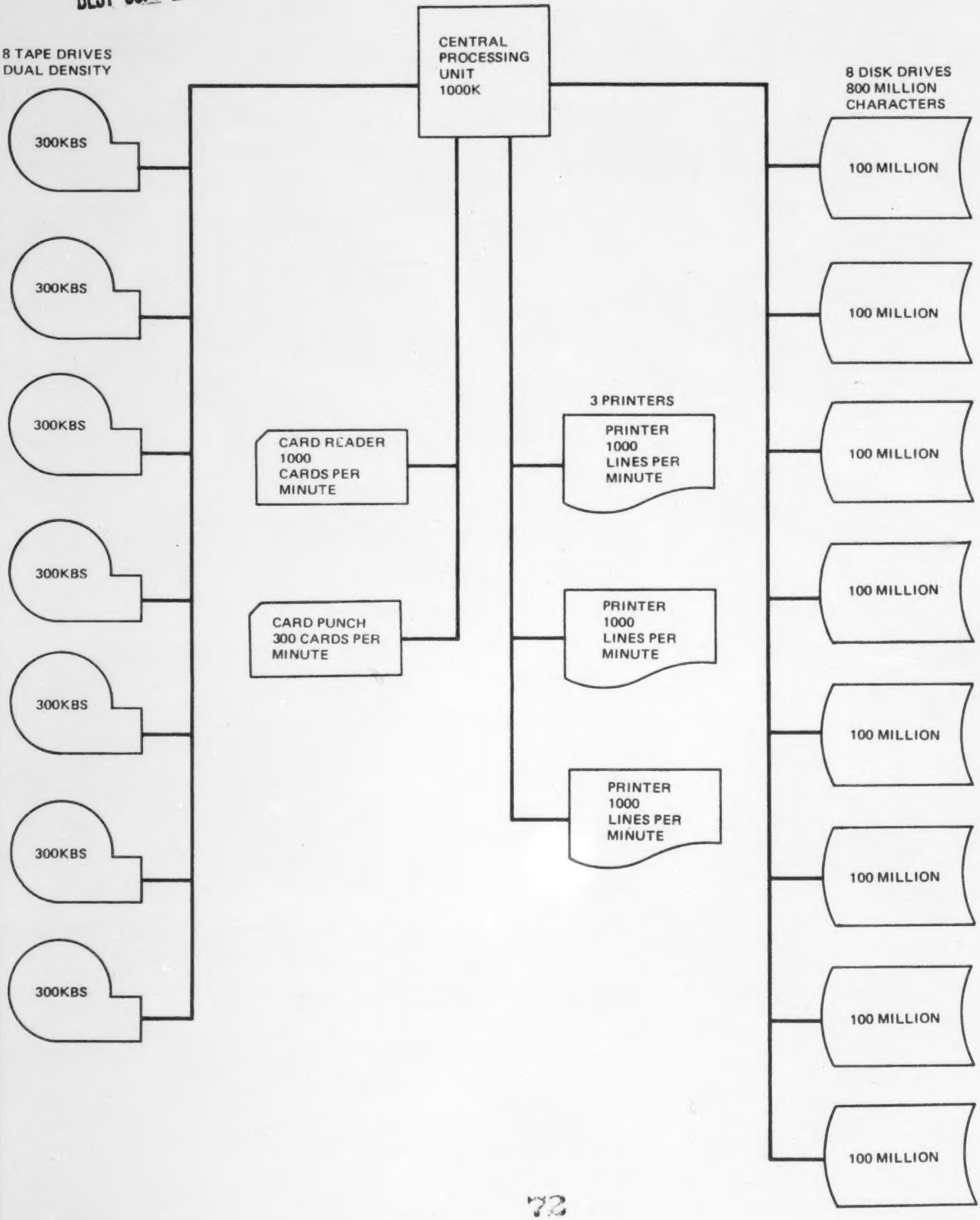
CENTRAL PROCESSING UNIT 1000K
8 TAPE DRIVES DUAL DENSITY
300KBS
300KBS
300KBS
300KBS
300KBS
300KBS
300KBS
300KBS
8 DISK DRIVES 800 MILLION CHARACTERS
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
CARD READER 1000 CARDS PER MINUTE
CARD PUNCH 300 CARDS PER MINUTE
3 PRINTERS
PRINTER 1000 LINES PER MINUTE
PRINTER 1000 LINES PER MINUTE
PRINTER 1000 LINES PER MINUTE

NUAL COST: $485,000 ± 10%

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FIGURE 21

ALTERNATIVE #4
STAFFING AT CENTRAL FACILITY (BATCH)

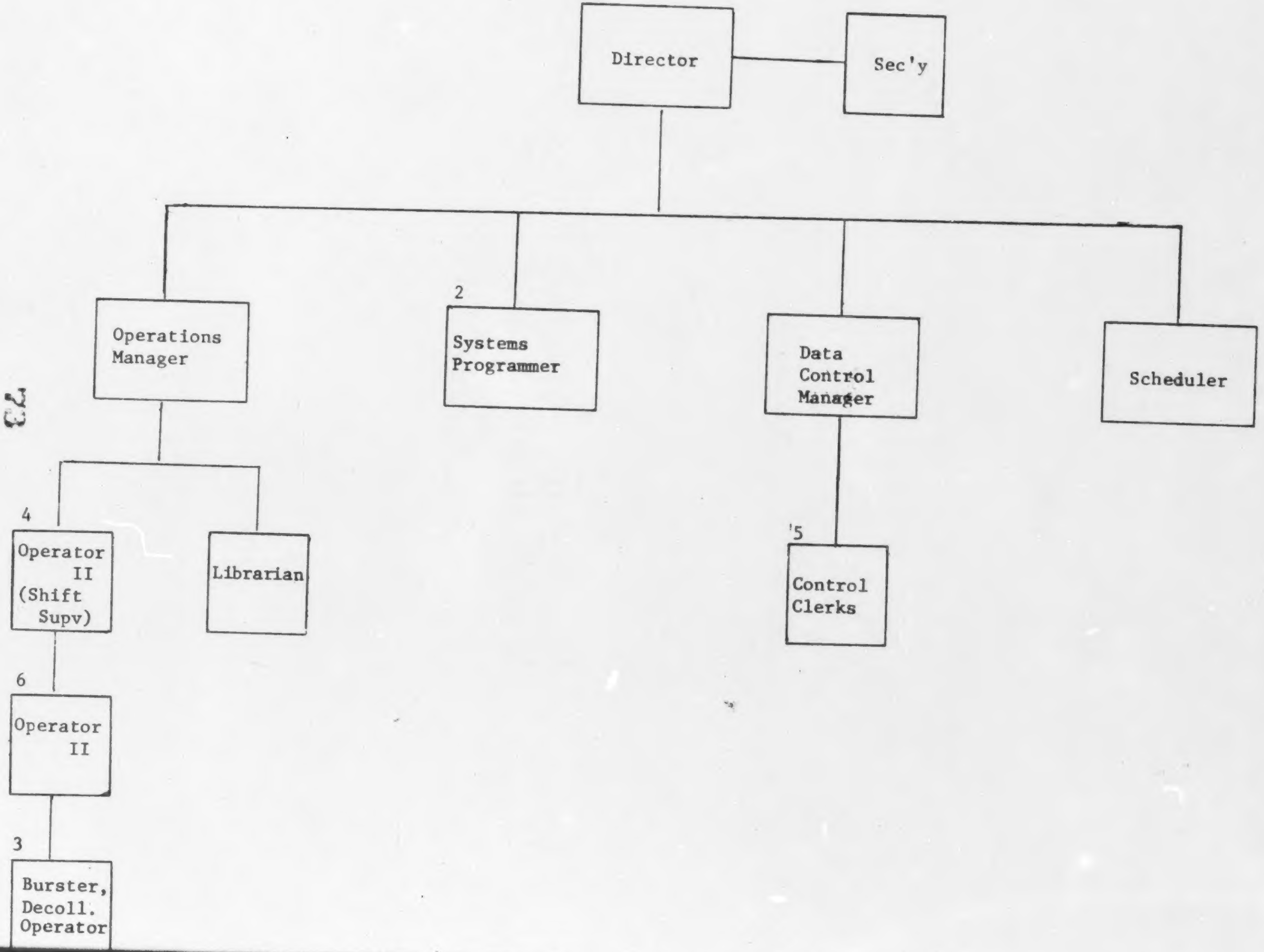
Director
Sec'y
Operations Manager
2
Systems Programmer
Data Control Manager
Scheduler
4
Operator II (Shift Supv)
Librarian
'5
Control Clerks
6
Operator II
3
Burster, Decoll. Operator

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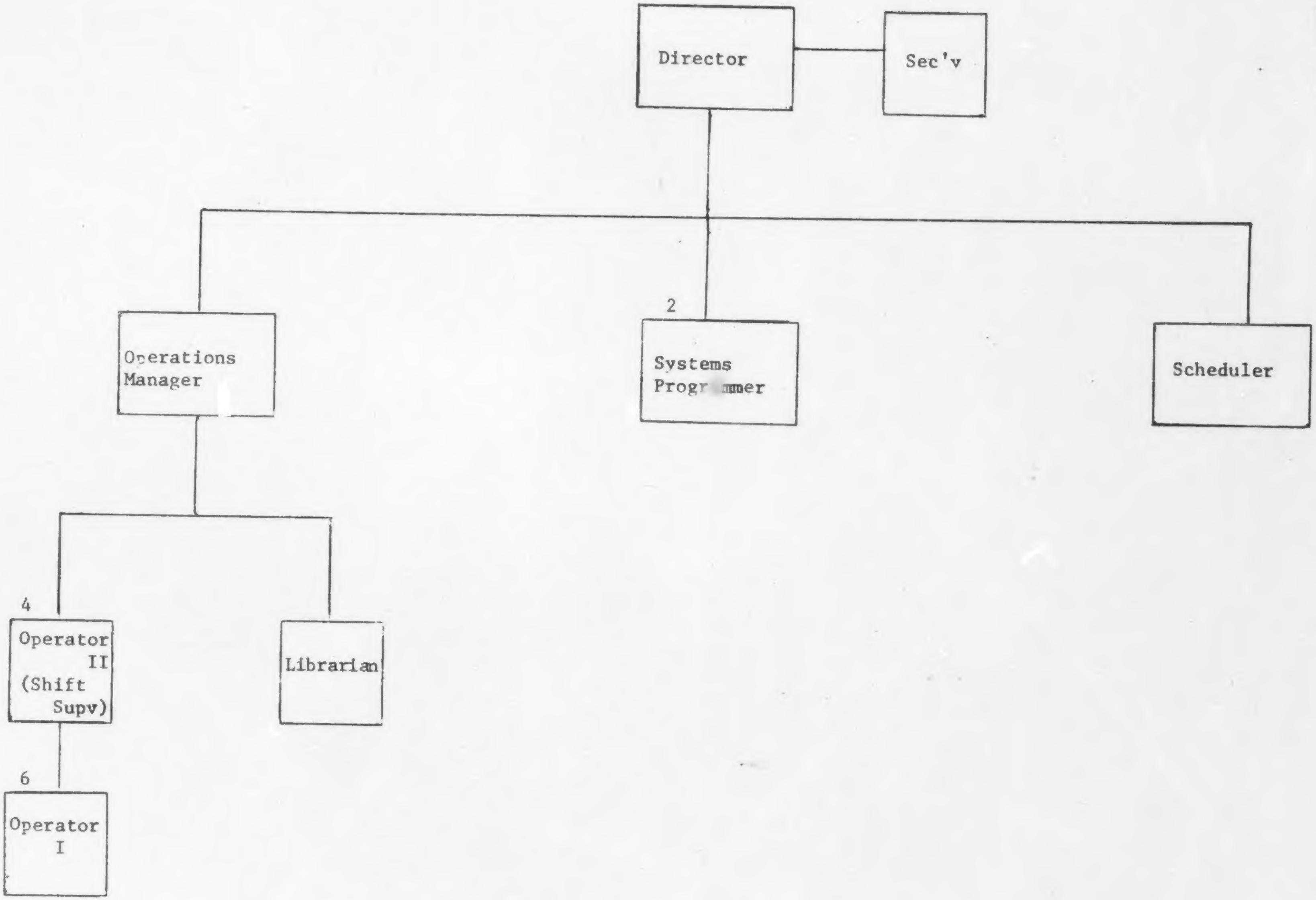
FIGURE 24

ALTERNATIVE #4 W/RJE or MINI
STAFFING AT CENTRAL FACILITY


Director
Sec'v
Operations Manager
2
Systems Programmer
Scheduler
4
Operator II (Shift Supv)
Librarian
6
Operator I

Alternative No. 4 – Batch Staffing at Central Facility

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 38,115	$ 38,115
Operations manager	1	33,541	33,541
Systems programmer	2	28,205	56,410
Scheduler	1	22,868	22,868
Librarian	1	13,552	13,552
Operator II (shift supervisor)	4	16,766	67,064
Operator I	6	15,271	91,626
Burster, decollator operator	3	14,036	42,108
Secretary to director	1	15,125	15,125
Data control manager	1	14,228	14,228
Control clerk	5	11,828	59,140
Total	26		$ 453,777

Alternative No. 4 – RJE or Mini Staffing at Central Facility

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 38,115	$ 38,115
Operations manager	1	33,541	33,541
Systems programmer	2	28,205	56,410
Scheduler	1	22,868	22,868
Librarian	1	13,552	13,552
Operator II (shift supervisor)	4	16,766	67,064
Operator I	6	15,271	91,626
Secretary to director	1	15,125	15,125
Total	17		$ 338,301

Applications

Under this alternative, each agency continues to use its separate applications. Thus, each agency sets its own priorities and direction and each maintains control of its own applications. No changes need be made in agency procedure or coding schemes.

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STAFFING AT EACH AGENCY (1979)
ALTERNATIVE NO. 4

	TOTAL	GRANT	LOS RIOS	SAC CITY	SAC COUNTY	SAN JUAN	TOTAL COST FOR POSITIONS ①
DATA PROCESSING MANAGER/COORDINATOR	4 1/2	1/2	1	1	1	1	$ 152,832
SYSTEMS ANALYST	4		3		1		104,716
SENIOR PROGRAMMER/SR. PROG./ANALYST	11		2	3②	4②	2	256,512
PROGRAMMER/PROG/ANALYST	11	1	3	3	2	2	215,194
EDUCATIONAL CONSULTANT	6			1	5		173,491
TEST ADMINISTRATOR	2				2		31,883
KEYPUNCH	22	2	3	6②	8②	3	257,859
TOTAL	60 1/2	3 1/2	12	14	23	8	1,192,487
w/ RJE OR MINI COMPUTER							
OPERATOR II	8 1/2	1/2	2	2	2	2	131,121
DATA CONTROL	8 1/2		1	3②	4	1/2	96,162
TOTAL	77 1/2	4	15	19	29	10 1/2	$ 1,419,770

① BASED ON 1979 PROJECTION, 5% PER YEAR SALARY INCREASE ALL FRINGE BENEFITS INCLUDED

② INCLUDES ONE SUPERVISOR

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IMPLEMENTATION – ALTERNATIVE 4

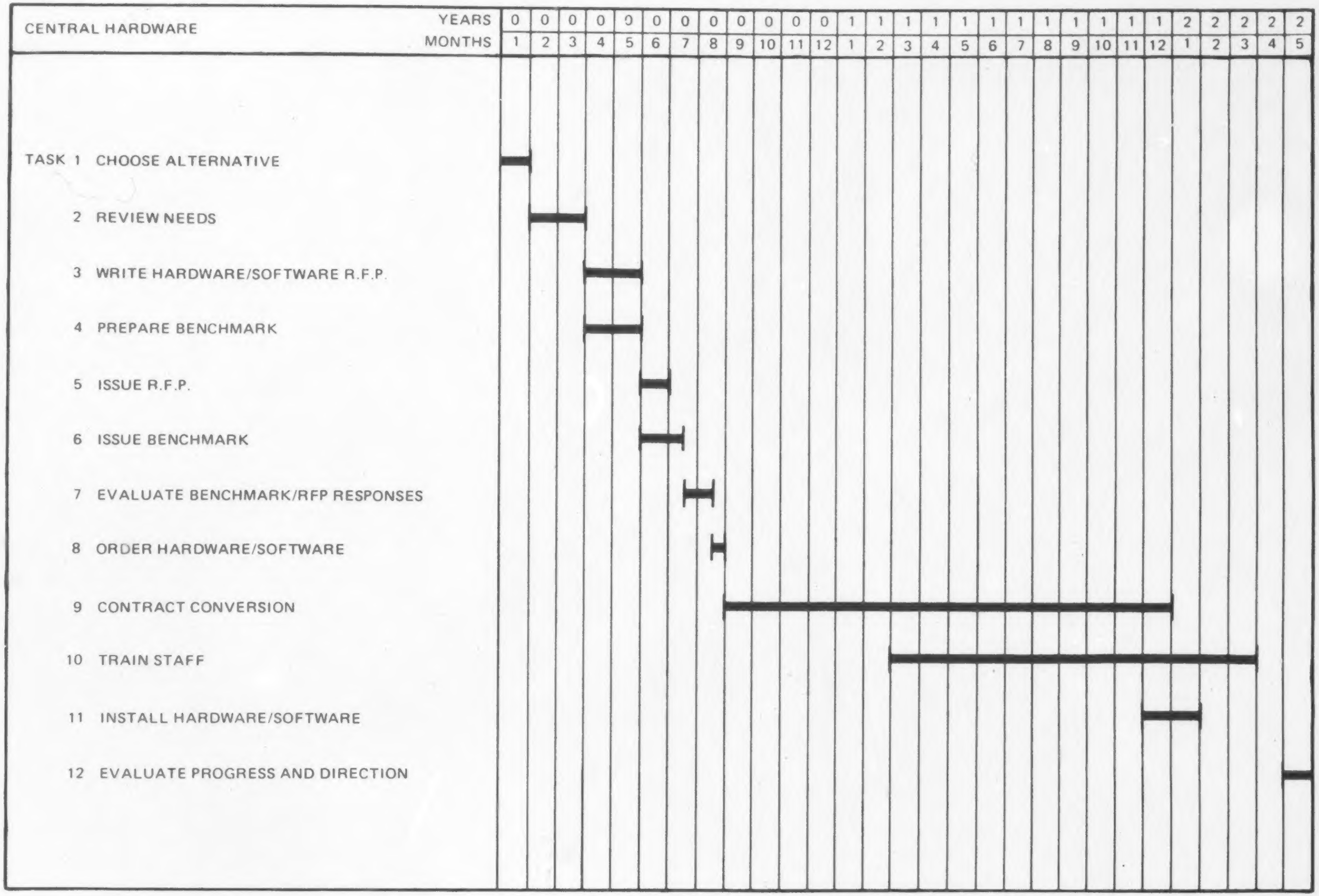

FIGURE 25

Organization and Administration

The central data center is administered by a director who reports to a steering committee which sets policy. User needs and feedback are conveyed to the director through a technical committee made up of the agency data processing coordinators. For details, see Appendix H.

Cost Allocation

Cost allocation is set by the steering committee based on utilization of programs, equipment and personnel. For details, see Appendix I.

Data Entry Standardization

Data entry is located at each agency. The standards need only conform to the needs of each agency as each agency has separate application programs. Therefore, there are no central standards other than those which may be imposed by hardware restraints. A hardware-imposed standard is self-enforcing as the hardware will not accept the data if it does not conform to the hardware specifications. The agency which provided the incompatible data will ultimately suffer the consequences.

Systems Design and Programming Standardization

No standardization is required as each agency is responsible for maintaining its own programs as well as standards. The only restraints are hardware-imposed.

If a minicomputer is to be used as a Remote Job Entry (RJE) station, it may also act as an independent processor for some programs. Any standards for independently run programs would be the responsibility of the agency using them.

Implementation Plan

Hardware procurement		9 months
Contract conversion		16 months
Staff training		12 months
Implementation		2 months
Evaluation		1 month
Total elapsed time	2 years	5 months

A graphic depiction of the implementation plan mentioned above is found in Figure 25. A detailed explanation is contained in Appendix F.

Alternative No. 4 – One-time Costs

Disk packs	$ 40,000
Shipping	10,000
Site preparation	40,000
Education	25,000
Contract conversion	300,000
Miscellaneous	10,000
Total cost	425,000
Less sale of present equipment	325,000
Net cost	$ 100,000

Alternative No. 4 – Recurring Costs

Personnel (1)	$ 1,646,262
Equipment computer	485,000 ± 10%
Equipment unit record	5,000
Equipment data entry	42,470
Equipment test scoring	35,000
Building rental	36,300
Utilities	5,000
Supplies	40,000
Ongoing education	2,000
Travel and conventions	1,000
Miscellaneous	5,000
Batch	$ 2,303,032
Remote job entry (2)	$ 2,549,174
Minicomputer (2)	2,579,211

(1) Based on 1979-80 school year assuming 5% inflation, includes all fringe benefits.

(2) Includes line and modem costs.

ALTERNATIVE NO. 5

- Central hardware
- Central applications maintenance staff
  Central applications development staff
- Separate applications

Batch

A central computer facility supplies the large central processing site shared by the individual agencies. The operations staff is centralized. The systems and programming staffs are essentially divided into two basic areas – maintenance and development. The maintenance staff is centralized and works on all applications that are operational. The development staffs are located at each agency and thus develop individual applications that are controlled by and responsive to each agency.

A steering committee sets general policy and cost allocation, while each agency maintains complete control over its own applications.

RJE

RJE means Remote Job Entry. Alternative No. 5 can have a variation where an RJE station is located in each agency. An RJE station consists of a data reader and a printer which send and receive information over high speed communications lines from a central computer which performs the actual processing. Thus, it would appear as if each agency had immediate access to an on-site computer.

The addition of the RJE station to Alternative No. 5 has little effect on staffing and applications. The primary advantage of RJE is improved turnaround time. An operator would be required at each RJE station and data control personnel would be located at each agency instead of the central site.

Mini

The term "mini" is an abbreviation for minicomputer. A minicomputer may have its own printer, card reader, disk drives, tape drives, memory and arithmetic-logic capability. This "mini" can be used as a Remote Job Entry (RJE) station communicating with a larger central computer. Since a minicomputer can be programmed to do independent processing or edit data being sent or received by the central system, it would be necessary to have a programmer at each "mini" site. This programmer could function as a programmer/operator depending on the amount of processing performed on the minicomputer. It is possible that certain minor applications could be performed in their entirety on the "mini."

Central Hardware – Separate Applications

Batch (see Figure 26):

CPU	1000K (relocatable memory)
Disk	800 million bytes (at least 8 spindles)
Tape	8 tape drives (at least 300 KBS)
Card	1000 CPM
Card punch	300 CPM
Printer	1000 LPM (3 printers)

RJE:

- One central printer
- Central card reader can be slower
- RJE print speed ranges from 300 LPM at Grant to 600 LPM at Sacramento City
- RJE card read speed 300-500 CPM

Mini:

- Same central hardware as RJE
- Mini CPU 16K to 32K (varies with agency)
- Mini disk capacity 2.5 to 10 million bytes (based on agency and applications)
- Mini read/print speeds same as RJE

This alternative requires an operating system capable of running five to seven partitions including a spooling program (for both batch and RJE). The operating system must be able to dynamically reallocate memory based on need and usage within each partition. Each agency would be allocated a 100K relocatable partition.

FIGURE 26

HARDWARE CONFIGURATION

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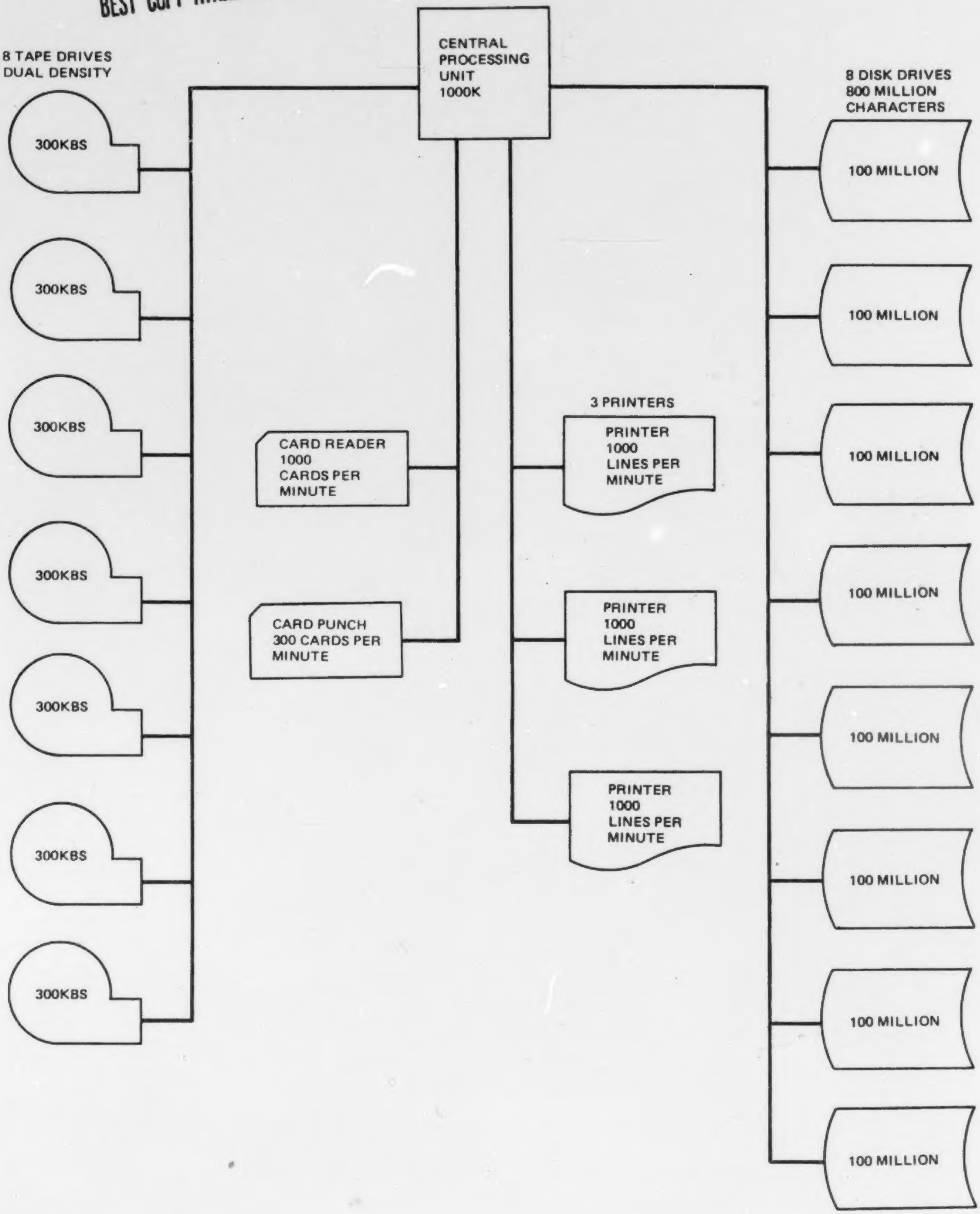
8 TAPE DRIVES
DUAL DENSITY
300KBS
300KBS
300KBS
300KBS
300KBS
300KBS
300KBS
CENTRAL PROCESSING UNIT 1000K
CARD READER 1000 CARDS PER MINUTE
CARD PUNCH 300 CARDS PER MINUTE
3 PRINTERS
PRINTER 1000 LINES PER MINUTE
PRINTER 1000 LINES PER MINUTE
PRINTER 1000 LINES PER MINUTE
8 DISK DRIVES
800 MILLION
CHARACTERS
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION

ANNUAL COST: $485,000 ± 10%

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FIGURE 27

ALTERNATIVE #5 - STAFFING AT CENTRAL FACILITY (BATCH)

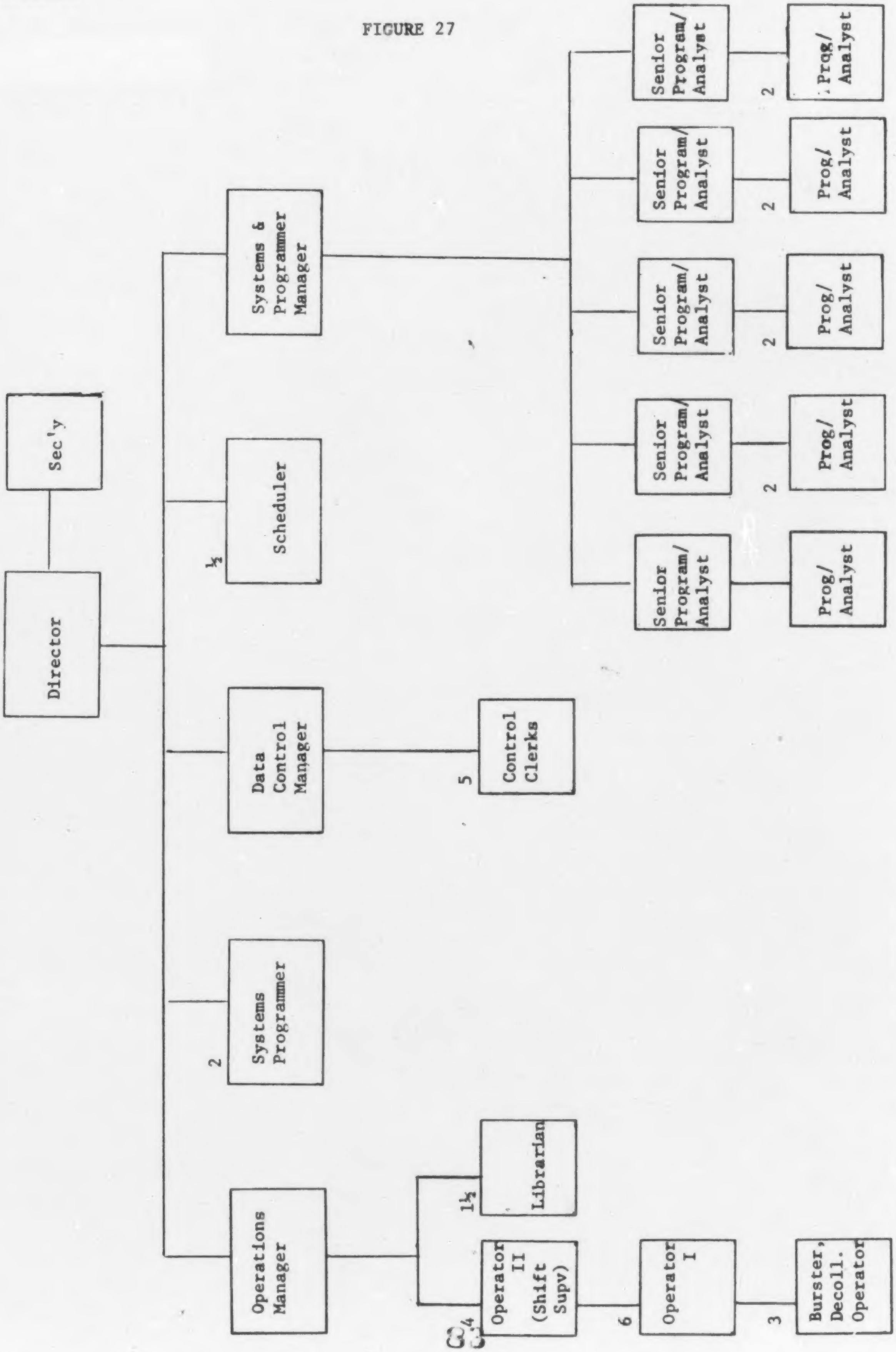
Director
Sec'y
Systems & Programmer Manager
½
Scheduler
Data Control Manager
5
Control Clerks
2
Systems Programmer
Operations Manager
1½
Librarian
4
Operator II (Shift Supv)
6
Operator I
3
Burster, Decoll. Operator
Senior Program/Analyst
2
Prog/Analyst
Senior Program/Analyst
2
Prog/Analyst
Senior Program/Analyst
2
Prog/Analyst
Senior Program/Analyst
2
Prog/Analyst
Senior Program/Analyst
Prog/Analyst

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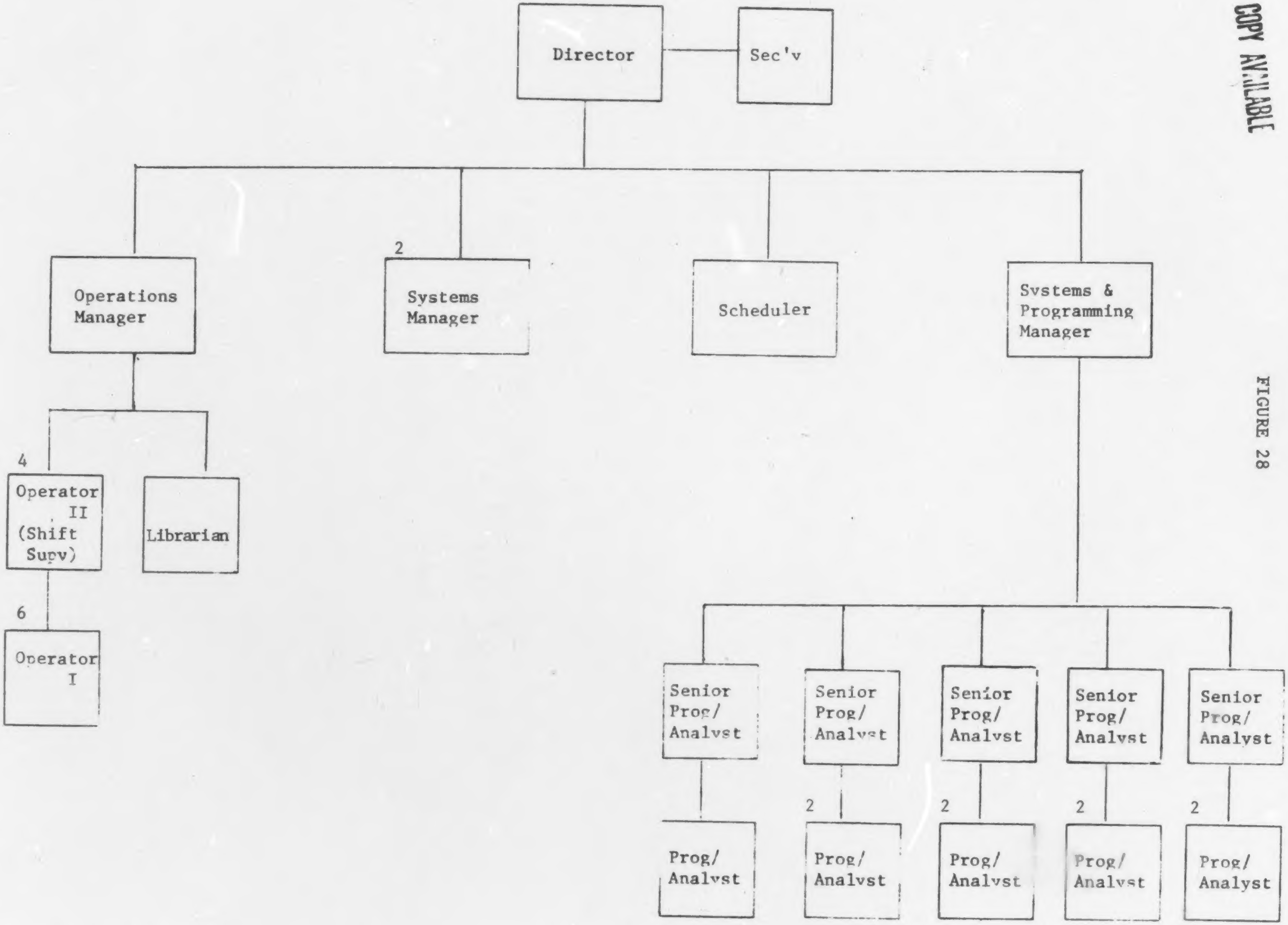
FIGURE 28

ALTERNATIVE #5 W/RJE or MINI STAFFING AT CENTRAL FACILITY


Director
Sec'y
Operations Manager
2
Systems Manager
Scheduler
Systems & Programming Manager
4
Operator II (Shift Supv)
Librarian
6
Operator I
Senior Prog/ Analyst
Senior Prog/ Analyst
Senior Prog/ Analyst
Senior Prog/ Analyst
Senior Prog/ Analyst
2
2
2
2
Prog/ Analyst
Prog/ Analyst
Prog/ Analyst
Prog/ Analyst
Prog/ Analyst

Alternative No. 5 – Batch Staffing at Central Facility

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 45,738	$ 45,738
Manager, systems and programming	1	38,115	38,115
Manager, operations	1	33,541	33,541
Scheduler	0.5	22,868	11,434
Systems programmer	2	28,205	56,410
Senior programmer/analyst	5	25,918	129,590
Programmer/analyst	9	23,631	212,679
Librarian	1.5	13,552	20,328
Operator II (shift supervisor)	4	16,766	67,064
Operator I	6	15,271	91,626
Burster, decollator operator	3	14,036	42,108
Secretary to director	1	15,125	15,125
Data control manager	1	14,228	14,228
Control clerk	5	11,828	59,140
Total	41		$ 837,126

Alternative No. 5 – RJE or Mini Staffing at Central Facility

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 45,738	$ 45,738
Manager, systems and programming	1	38,115	38,115
Manager, operations	1	33,541	33,541
Scheduler	1	22,868	22,868
Systems programmer	2	28,205	56,410
Senior programmer/analyst	5	25,918	129,590
Programmer/analyst	9	23,631	212,679
Librarian	1	13,552	13,552
Operator II (shift supervisor)	4	16,766	67,064
Operator I	6	15,271	91,626
Secretary to director	1	15,125	15,125
Total	32		$ 726,309

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STAFFING AT EACH AGENCY (1979)
ALTERNATIVE NO. 5

	TOTAL	GRANT	LOS RIOS	SAC CITY	SAC COUNTY	SAN JUAN	TOTAL COST FOR POSITIONS ①
DATA PROCESSING MANAGER/COORDINATOR	4 1/2	1/2	1	1	1	1	$ 152,832
SYSTEMS ANALYST	2		1		1		52,062
SR. PROGRAMMER/SR. PROG/ANALYST	6		2	1	2	1	138,279
PROGRAMMER/PROG/ANALYST	4		1	2	1		82,653
EDUCATIONAL CONSULTANT	6			1	5		173,491
TEST ADMINISTRATOR	2				2		31,883
KEYPUNCH	22	2	3	6 ②	8 ②	3	257,859
TOTAL	46 1/2	2 1/2	8	11	20	5	889,059
w/ RJE							
OPERATOR II	8 1/2	1/2	2	2	2	2	131,121
DATA CONTROL	8 1/2		1	3 ②	4	1/2	96,162
TOTAL	63 1/2	3	11	16	26	7 1/2	1,116,342
w/ MINI COMPUTER							
PROGRAMMER	4		1	1	1	1	80,889
TOTAL	67 1/2	3	12	17	27	8 1/2	$ 1,197,231

① BASED ON 1979 PROJECTION, 5% PER YEAR SALARY INCREASE ALL FRINGE BENEFITS INCLUDED

② INCLUDES ONE SUPERVISOR

Applications

Under this alternative, each agency continues to use its separate applications. Thus, each agency sets its own priorities and direction and each maintains control of its own applications. No changes need be made in agency procedure or coding schemes.

Organization and Administration

The central data center is administered by a director who reports to a steering committee which sets policy. User needs and feedback are conveyed to the director through a technical committee made up of the agency data processing coordinators. For details, see Appendix H.

Cost Allocation

Cost allocation is set by the steering committee based on utilization of programs, equipment and personnel. For details, see Appendix I.

Data Entry Standardization

Data entry is located [illegible] each agency. The standards need only conform to the needs of each agency as each agency has separate application programs. Therefore, no central standards other than those which may be imposed by hardware restraints are necessary. A hardware-imposed standard is self-enforcing as it will not accept the data if the data does not conform to the hardware specifications. The agency which provided the incompatible data will ultimately suffer the consequences.

Systems Design and Programming Standardization

No standardization need be imposed as each agency has its own separate application programs. Since program maintenance is performed by a central staff, some form of standardization will be required. Additional standards required are those imposed by the hardware and operating system.

If a minicomputer is to be used as an RJE station, it may also act as an independent processor for some applications. Any standards for those independently run programs would be solely the responsibility of the agency using them.

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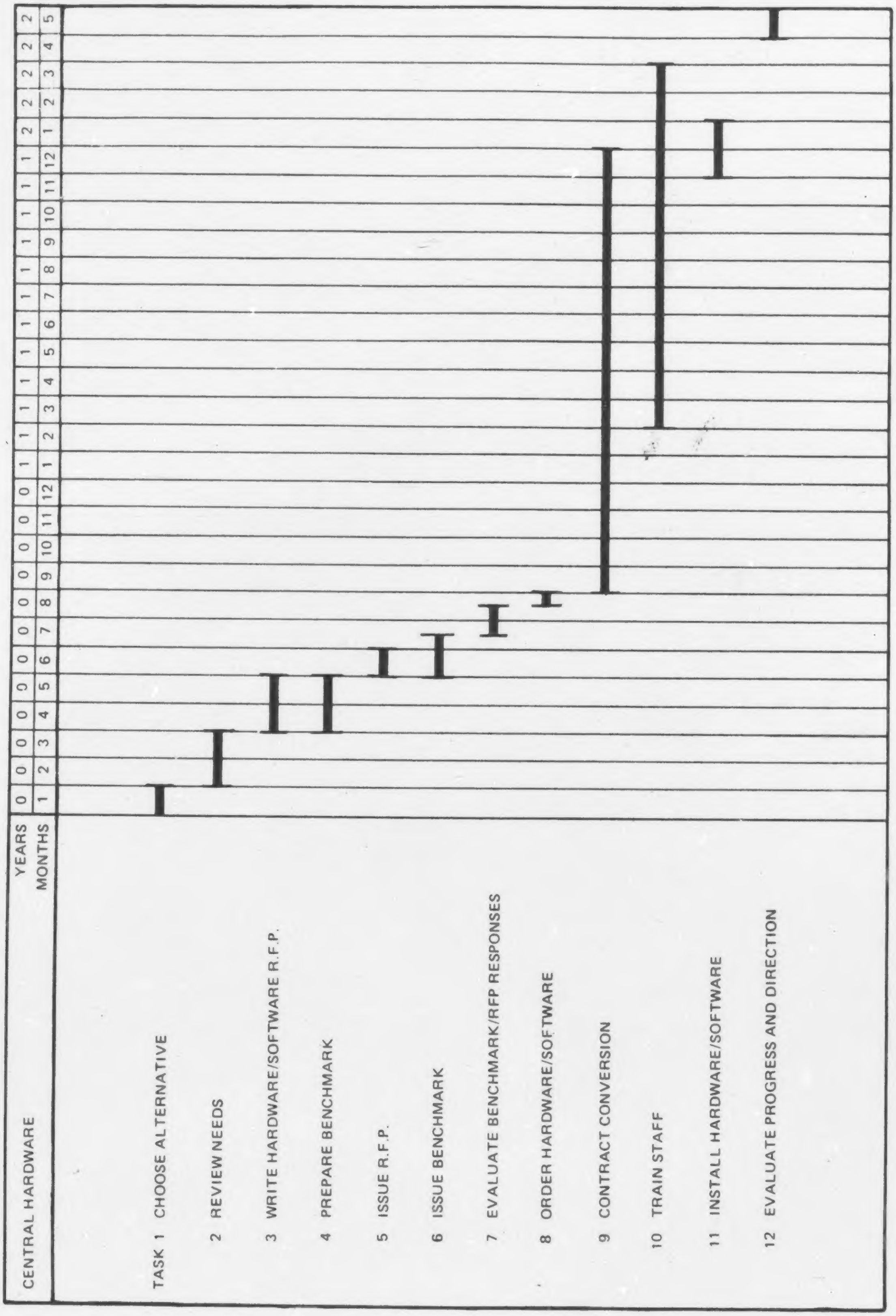
FIGURE 29

IMPLEMENTATION – ALTERNATIVE 5



Implementation Plan

Hardware procurement	9 months
Contract conversion	16 months
Staff training	12 months
Implementation	2 months
Evaluation	1 month
Total elapsed time	2 years 5 months

A graphic depiction of the implementation plan mentioned above is found in Figure 29. A detailed explanation is contained in Appendix F.

Alternative No. 5 – One-time Costs

Disk packs	$ 40,000
Shipping	10,000
Site preparation	40,000
Education	25,000
Contract conversion	300,000
Miscellaneous	10,000
Total cost	425,000
Less sale of present equipment	325,000
Net cost	$ 100,000

Alternative No. 5 – Recurring Costs

Personnel (1)	$ 1,726,185
Equipment computer	485,000 ± 10%
Equipment unit record	5,000
Equipment data entry	42,470
Equipment test scoring	35,000
Building rental	50,160
Utilities	5,000
Supplies	40,000
Ongoing education	6,000
Travel and conventions	1,500
Miscellaneous	5,000
Batch	$ 2,401,315
Remote Job Entry (2)	$ 2,647,457
Minicomputer (2)	2,800,757

(1) Based on 1979-80 school year assuming 5% inflation, includes all fringe benefits.

(2) Includes line and modem costs.

ALTERNATIVE NO. 6

- Central hardware
- Some central systems and programming staff
  Some separate systems and programming staff
- Some common applications
  Some separate applications

Batch

A large central computer center serves the processing needs of the participating agencies by providing each agency with some separate section (partition) as well as maintaining shared sections of the computer. The systems and programming staffs are divided in a way that provides some centralized systems and programming support and some individual capability at each agency. Some of the applications would be integrated to run as common to all agencies (or some of the agencies) and some of the applications would be wholly developed and maintained by each individual agency and its staff.

An in-depth analysis (involving many man-months of analyst/programmer and data processing director time from each agency) would be undertaken to implement those applications which lend themselves to a common approach. Each agency would have the opportunity to express its unique needs as well as benefit from the sharing of commonalities.

A steering committee would be established to set policy, settle disagreements, and distribute costs.

RJE

RJE means Remote Job Entry. Alternative No. 6 can have a variation where an RJE station is located in each agency. An RJE station consists of a data reader and a printer which send and receive information over high speed communications lines from a central computer which performs the actual processing. Thus, it would appear as if each agency had immediate access to an on-site computer.

The addition of the RJE station to Alternative No. 6 has little effect on staffing and applications. The primary advantage of RJE is improved turnaround time. An operator would be required at each RJE station and data control personnel would be located at each agency instead of the central site.

Mini

The term "mini" is an abbreviation for minicomputer. A minicomputer may have its own printer, card reader, disk drives, tape drives, memory and arithmetic-logic capability. This "mini" can be used as a Remote Job Entry (RJE) station communicating with a larger central computer. Since a minicomputer can be programmed to do independent processing or edit data being sent or received by the central system, it would be necessary to have a programmer at each "mini" site. This programmer could function as a programmer/operator depending on the amount of processing performed on the minicomputer. It is possible that certain minor applications could be performed in their entirety on the "mini."

Central Hardware – Some Common Applications
Some Separate Applications

Batch (see Figure 30):

CPU	750K (relocatable memory)
Disk	800 million bytes (at least 8 spindles)
Tape	6 tape drives (at least 300 KBS)
Card	1000 CPM
Card punch	300 CPM
Printer	1000 LPM (3 printers)

RJE:
- One central printer
- Central card reader can be slower
- RJE print speed ranges from 300 LPM at Grant to 600 LPM at Sacramento City
- RJE card read speed 300-500 CPM

Mini:
- Same central hardware as RJE
- Mini CPU 16K to 32K (varies with agency)
- Mini disk capacity 2.5 to 10 million bytes (based on agency and applications)
- Mini I/O speeds same as RJE

This alternative would require an operating system capable of running five to seven partitions including a spooling program (for both batch and RJE). The operating system must be able to dynamically reallocate memory based on need and usage within each partition. Each agency would be allocated to a 100K partition as would any common applications.

FIGURE 30
HARDWARE CONFIGURATION

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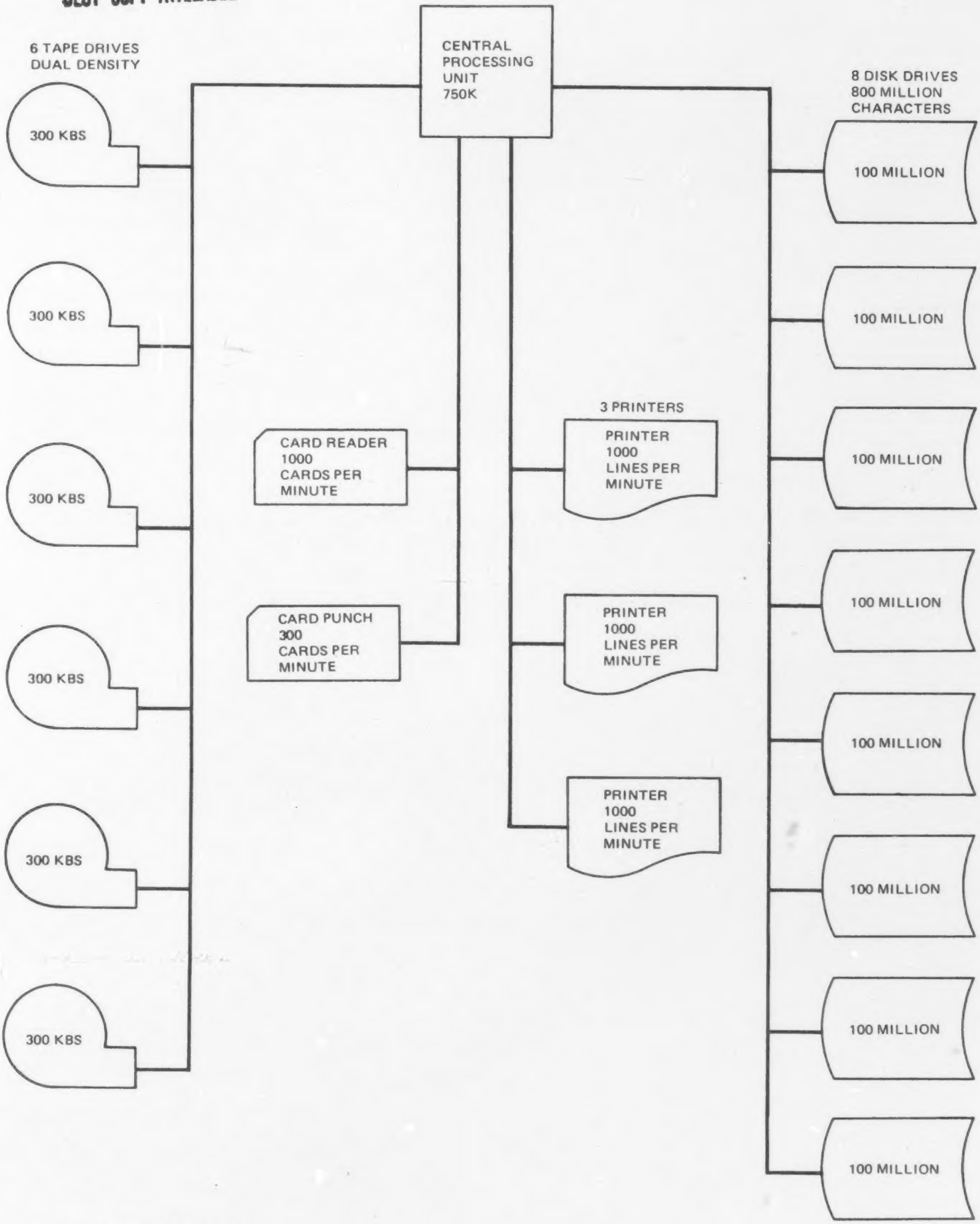
6 TAPE DRIVES
DUAL DENSITY
300 KBS
300 KBS
300 KBS
300 KBS
300 KBS
300 KBS
CENTRAL
PROCESSING
UNIT
750K
CARD READER
1000
CARDS PER
MINUTE
CARD PUNCH
300
CARDS PER
MINUTE
3 PRINTERS
PRINTER
1000
LINES PER
MINUTE
PRINTER
1000
LINES PER
MINUTE
PRINTER
1000
LINES PER
MINUTE
8 DISK DRIVES
800 MILLION
CHARACTERS
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION
100 MILLION

ANNUAL COST: $444,700 ± 10%

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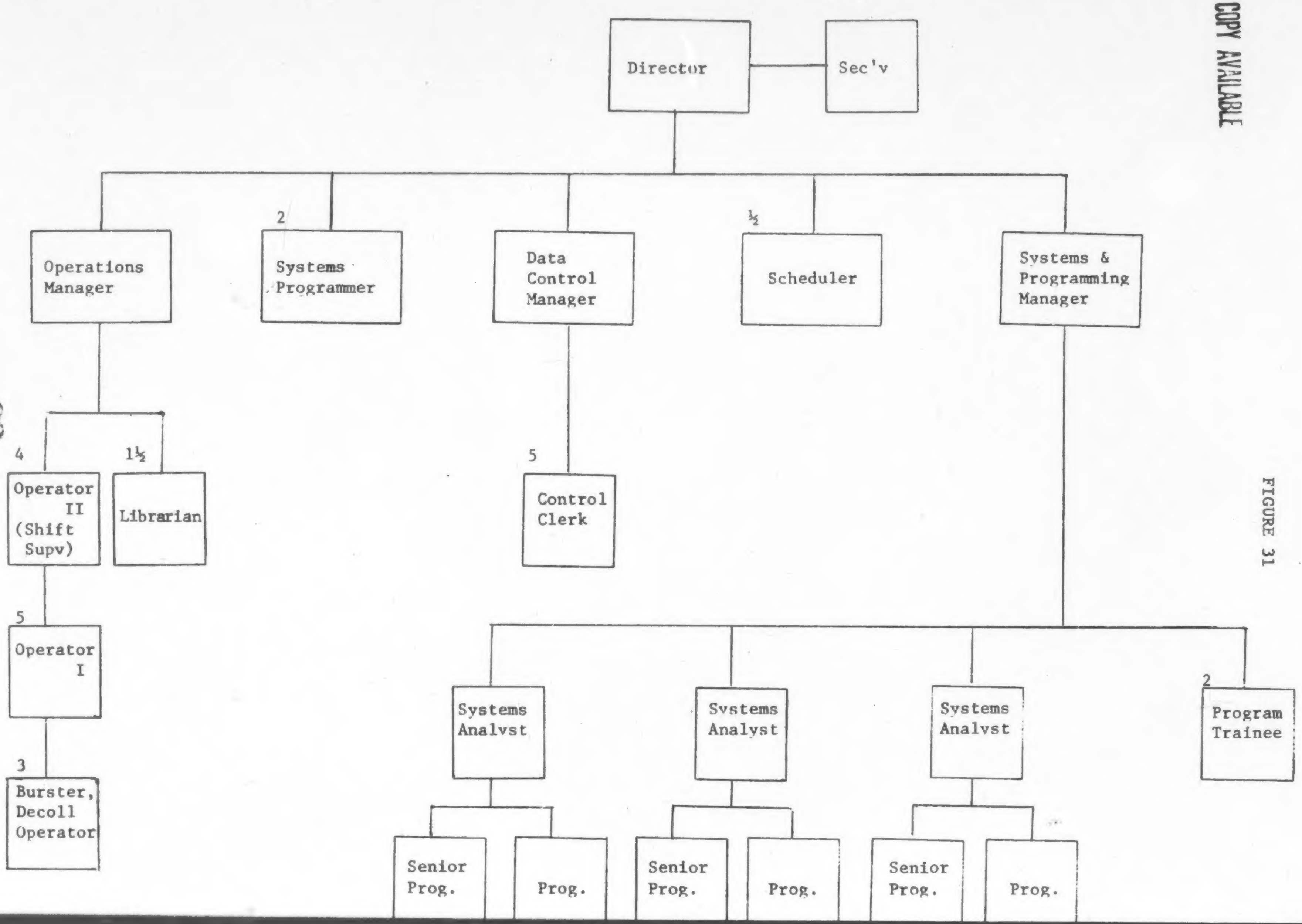
FIGURE 31

ALTERNATIVE #6 - STAFFING AT CENTRAL FACILITY (BATCH)


Director
Sec'y
Operations Manager
2
Systems Programmer
Data Control Manager
½
Scheduler
Systems & Programming Manager
4
Operator II (Shift Supv)
1½
Librarian
5
Operator I
3
Burster, Decoll Operator
5
Control Clerk
Systems Analyst
Senior Prog.
Prog.
Systems Analyst
Senior Prog.
Prog.
Systems Analyst
Senior Prog.
Prog.
2
Program Trainee

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ALTERNATIVE #6 W/ RJE or MINI STAFFING AT CENTRAL FACILITY

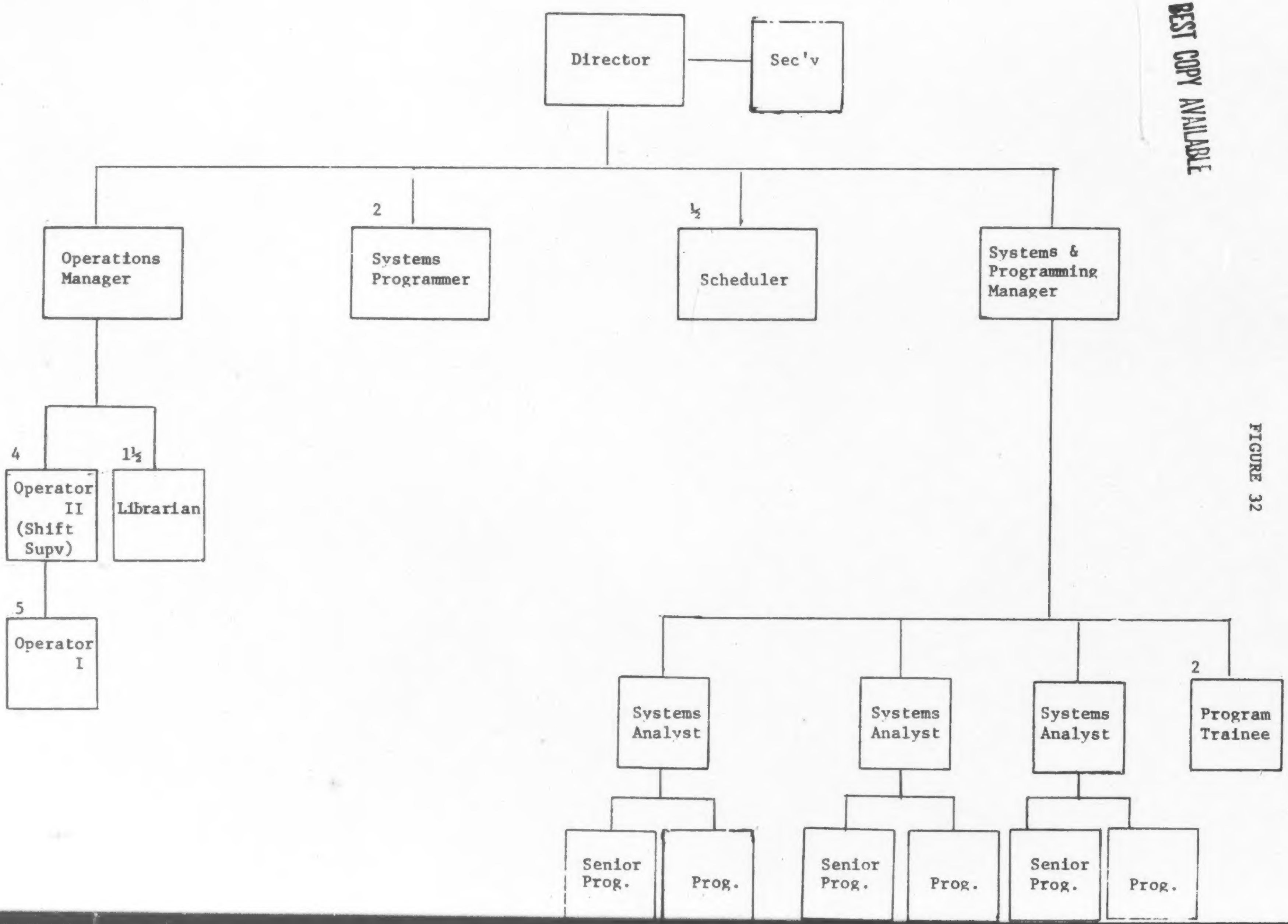
Director
Sec'v
Operations Manager
2
Systems Programmer
½
Scheduler
Systems & Programming Manager
4
Operator II (Shift Supv)
1½
Librarian
5
Operator I
Systems Analyst
Systems Analyst
Systems Analyst
2
Program Trainee
Senior Prog.
Prog.
Senior Prog.
Prog.
Senior Prog.
Prog.

FIGURE 32

Alternative No. 6 – Batch
Staffing at Central Facility

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 45,738	$ 45,738
Manager, systems and programming	1	38,115	38,115
Manager, operations	1	33,541	33,541
Systems programmer	2	28,205	56,410
Scheduler	0.5	22,868	11,434
Systems analyst	3	27,442	82,326
Senior programmer	3	25,918	77,754
Programmer	3	23,631	70,893
Programmer trainee	2	18,295	36,590
Librarian	1.5	13,552	20,328
Operator II (shift supervisor)	4	16,766	67,064
Operator I	5	15,271	91,626
Secretary to Director	1	15,125	15,125
Burster, decollator operator	3	14,036	42,108
Data control manager	1	14,228	14,228
Control clerk	5	11,828	59,140
Total	37		$ 762,420

Alternative No. 6 – RJE or Mini
Staffing at Central Facility

	Number of staff	Average salary including benefits	Total cost for positions
Director	1	$ 45,738	$ 45,738
Manager, systems and programming	1	38,115	38,115
Manager, operations	1	33,541	33,541
Systems programmer	2	28,205	56,410
Scheduler	1	22,868	22,868
Systems analyst	3	27,442	82,326
Senior programmer	3	25,918	77,754
Programmer	3	23,631	70,893
Programmer trainee	2	18,295	36,590
Librarian	1	13,552	13,552
Operator II (shift supervisor)	4	16,766	67,064
Operator I	5	15,271	91,626
Secretary to director	1	15,125	15,125
Total	28		$ 651,602

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STAFFING AT EACH AGENCY (1979)
ALTERNATIVE NO. 6

	TOTAL	GRANT	LOS RIOS	SAC CITY	SAC COUNTY	SAN JUAN	TOTAL COST FOR POSITIONS ①
DATA PROCESSING MANAGER/COORDINATOR	4 1/2	1/2	1	1	1	1	$ 152,832
SYSTEMS ANALYST	2		1		1		52,062
SR. PROGRAMMER/SR. PROG/ANALYST	6		2	1	2	1	138,279
PROGRAMMER/PROG/ANALYST	4		1	2	1		82,653
EDUCATIONAL CONSULTANT	6			1	5		173,491
TEST ADMINISTRATOR	2				2		31,883
KEYPUNCH	22	2	3	6 ②	8 ②	3	257,859
TOTAL	46 1/2	2 1/2	8	11	20	5	889,059
w/ RJE							
OPERATOR II	8 1/2	1/2	2	2	2	2	131,121
DATA CONTROL	8 1/2		1	3 ②	4	1/2	96,162
TOTAL	63 1/2	3	11	16	26	7 1/2	1,116,342
w/ MINI COMPUTER							
PROGRAMMER	4		1	1	1	1	80,889
TOTAL	67 1/2	3	12	17	27	8 1/2	$ 1,197,231

① BASED ON 1979 PROJECTION, 5% PER YEAR SALARY INCREASE ALL FRINGE BENEFITS INCLUDED

② INCLUDES ONE SUPERVISOR

Applications

Alternative No. 6 is an intermixing of application consolidation and maintenance of separate unique applications. This blending of separate and common applications will create a system that has:

- Some common basis of communication
- Common applications available to all agencies
- A great variety of applications available
- Each agency maintaining control of some applications
- Each agency having the option of following its own direction in each area
- Some interdistrict information transfer readily available.

See Appendix B for a discussion of potential common applications.

Organization and Administration

The central data center is administered by a director who reports to a steering committee which sets policy. User needs and feedback are conveyed to the director through a technical committee made up of the agency data processing coordinators. For details, see Appendix H.

Cost Allocation

Cost allocation is set by the steering committee based on utilization of programs, equipment and personnel. For details, see Appendix I.

Data Entry Standardization

Data entry is located at each agency. In this alternative there are some common applications and some separate applications. For the separate applications, data entry standards need only fit with the restrictions imposed by hardware and operating system limitations. For common applications, there must be strict adherence to standards set by the central programming staff.

If a minicomputer is used as a Remote Job Entry (RJE) station, there may be added flexibility to data preparation for common programs. The minicomputer can be programmed to edit and reformat data to conform to central standards even though it is prepared under seemingly incompatible agency standards.

Systems Design and Programming Standardization

The common applications are developed and maintained by a central systems and programming staff. Standards for these applications would be set by the central staff and are easily enforced, as all staff reports to the same manager. The separate applications would be developed and maintained by each district, which would also be responsible for setting standards within the limits of the hardware and operating system of the central computer. If a minicomputer is used as an RJE station, it may also be used as an independent processor. Any standards for those independently run programs would be solely the responsibility of the agency using them.

Implementation Plan

Hardware procurement	9 months
Contract conversion	16 months
Staff training	12 months
General systems design	4 months
Detail design	11.5 months
Implementation	10.5 months
Evaluation	2 months
Total elapsed time	3 years 6 months

Graphic depictions of the implementation plan mentioned above are found in Figures 33 and 34. A detailed explanation is contained in Appendix F.

IMPLEMENTATION – ALTERNATIVE 6

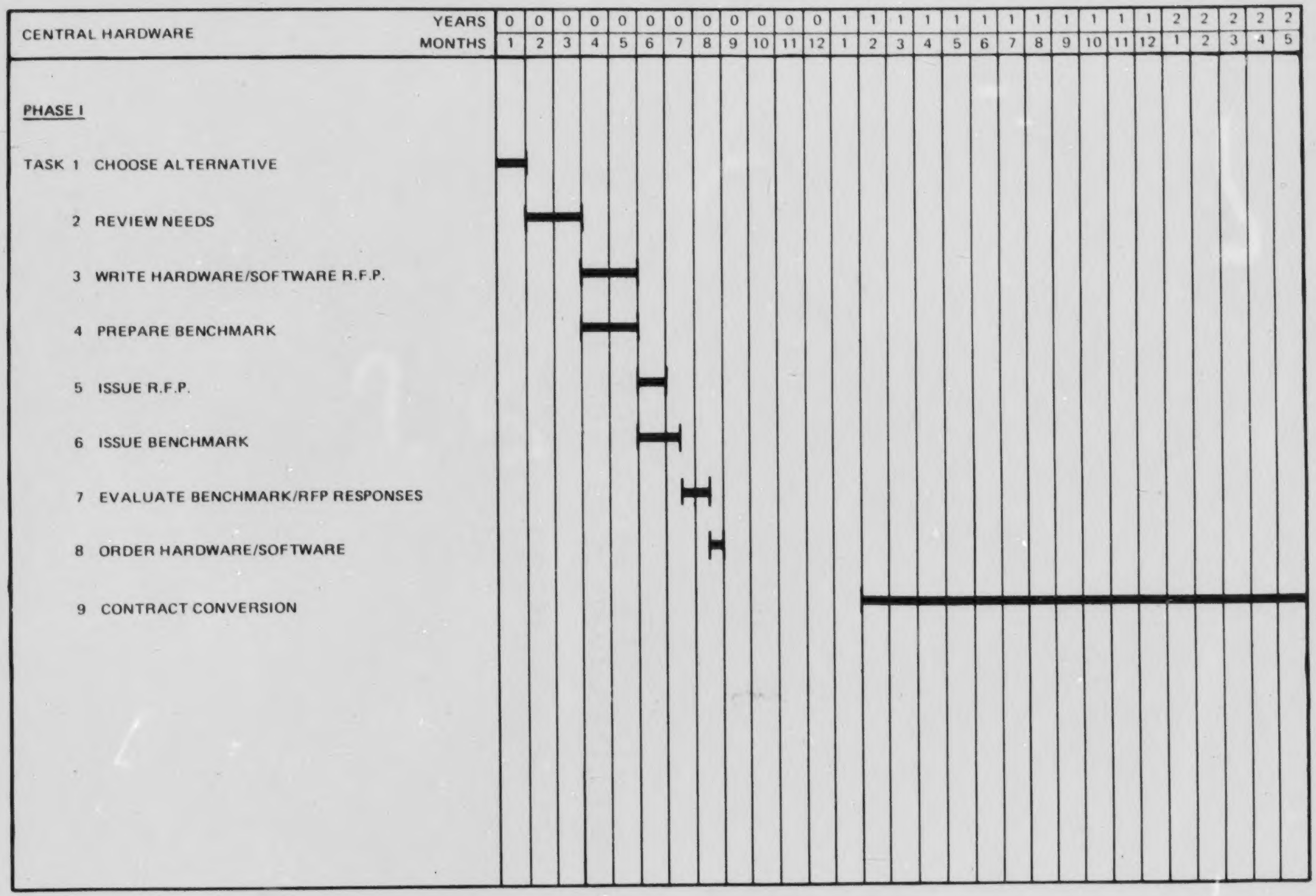

FIGURE 33

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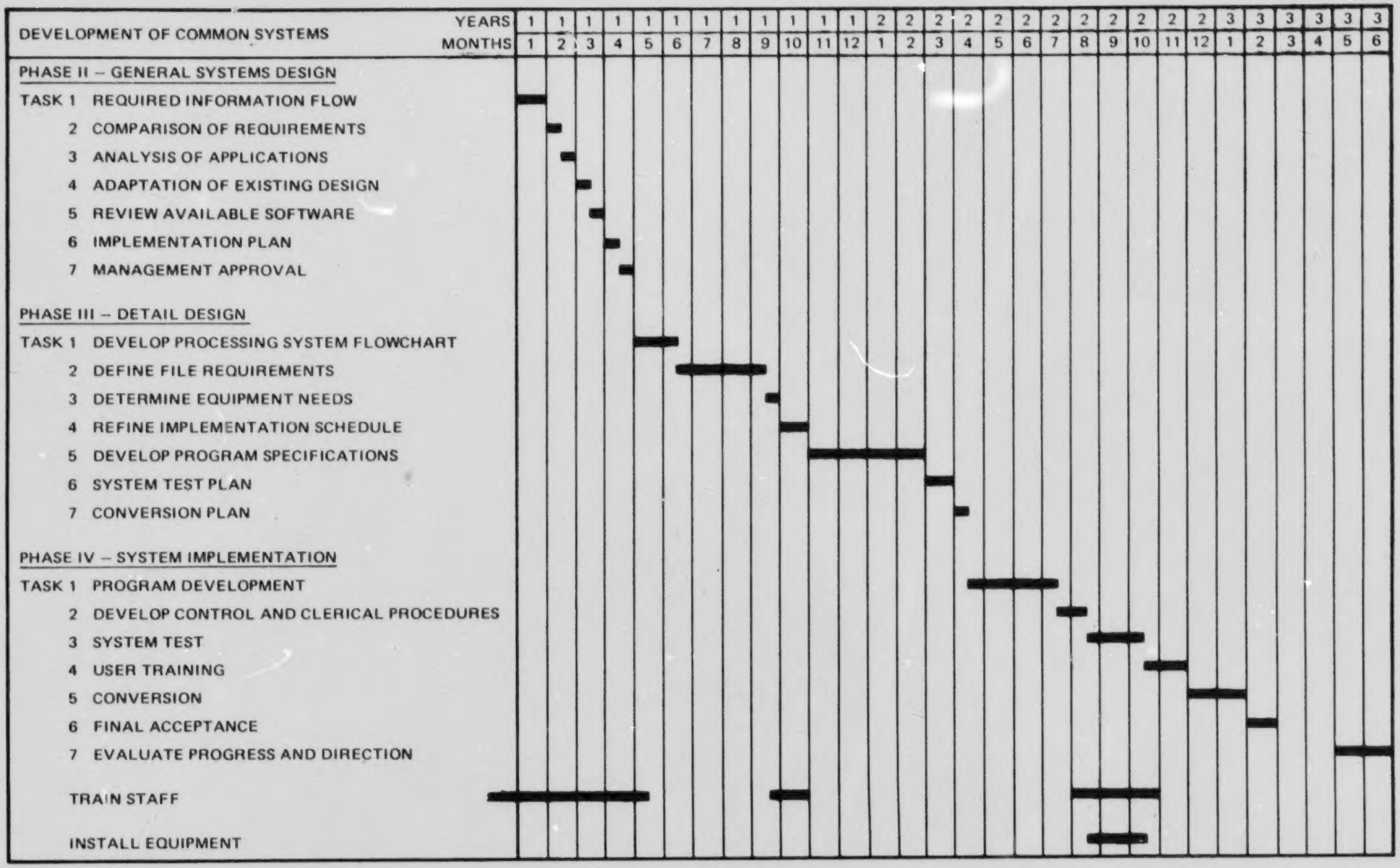
FIGURE 34

IMPLEMENTATION – ALTERNATIVE 6



Alternative No. 6 – One-time Costs

Disk packs	$ 35,000
Shipping	9,000
Site preparation	40,000
Education	30,000
Contract common chart of accounts	10,000
Contract conversion	150,000
Supplemental development personnel	50,000
Miscellaneous	10,000
Total cost	334,000
Less sale of present equipment	325,000
Net cost	$ 9,000

Alternative No. 6 – Recurring Costs

Personnel (1)	$ 1,651,479	
Equipment computer	444,700	± 10%
Equipment unit record	5,000	
Equipment data entry	42,470	
Equipment test scoring	35,000	
Building rental	47,520	
Utilities	5,000	
Supplies	40,000	
Ongoing education	6,000	
Travel and conventions	1,500	
Miscellaneous	5,000	
Batch	$ 2,283,669	
Remote Job Entry (2)	$ 2,529,811	
Minicomputer (2)	2,683,111	

(1) Based on 1979-80 school year assuming 5% inflation, includes all fringe benefits.

(2) Includes line and modem costs.

COMPARISON OF ALTERNATIVES

In reviewing the advantages and disadvantages of each alternative plan, we have examined the advantages and disadvantages on three different levels:

1. Applications – common versus separate
2. Hardware – centralized versus decentralized
3. Personnel – centralized versus decentralized.

Application Considerations

The following application considerations are key in a centralized environment:

- The design of common systems allows the possible centralization of key agency functions such as purchasing, accounts payable, cafeteria, etc. The fact that these functions *can* be centralized reduces the duplication of reporting functions and reduces the overall cost of agency support staff.
- Centralized systems with their increased flow of management information tend to increase management control over the functions which have been centralized.
- The central environment with its wide range of technical skills provides the ability to bring considerable resources to bear on a particular problem when it occurs.
- It is possible to provide rapid turnaround to requests for Countywide data.
- Consistent data in similar format is available for each agency (interdistrict record transfer would be simplified).
- The opportunity to invest in or develop sophisticated software is more easily achieved in a centralized environment.
- Less maintenance costs are incurred for common systems in a centralized environment.

The disadvantages of central control over applications are noted as follows:

- Centrally developed systems are *not always* as responsive to local user requests as locally developed systems.

- There is the possibility of increased time to implement new applications as they must satisfy a multitude of users.
- It is often difficult for separate agencies to agree on a common approach.
- It is difficult to assign priorities to local requests for enhancements to or maintenance of commonly utilized centralized systems.
- Scheduling of centralized systems *could* present a problem with similar peak-load schedules.

The following pages discuss the advantages and disadvantages of each alternative relating to hardware (batch, RJE, and mini) and personnel.

Alternative No. 1 – Hardware and Personnel Separate

Basic advantages	Basic disadvantages
1. Individual agency objectives are easier to achieve.	1. High hardware costs and overhead.
2. Staff has expertise required to respond to individual problems within their agency.	2. High personnel costs.
3. Each agency sets its own priorities.	3. Difficult to track Countywide trends.
4. Limited dependence on communications (either teleprocessing or interdistrict mail).	4. No sharing of development costs.
5. Hardware malfunctions only affect a single agency.	5. Inefficient utilization of computer resources.
	6. Inability to use large data base management systems.
	7. Interagency information sharing is more difficult.
	8. Difficult to justify high overhead and sophisticated software.
	9. Duplication of software costs.
	10. Costly to staff for high mix of skills.
	11. Lack of standardization.

Alternative Nos. 2 and 3 –
Hardware and Personnel Centralized

Basic advantages	Basic disadvantages
1. Low management information costs.	1. Individual agency priorities may not be as high as under separate systems.
2. Small user has access to more powerful processing unit.	2. May have problems meeting schedule commitments due to communications problems (both electronic and human)
3. A common pool of staff provides a wider range of skills and techniques.	3. Users think that their priorities take second place to those of other users.
4. All data is standardized and more easily interchanged.	4. May have problems responding to urgent agency requests and unique needs.
5. Countywide information is available.	5. Agencies will complain about the methodology and equitability of accounting and billing for central service.
6. All agencies base decisions on information from standardized information system.	6. Hardware problems affect all users.
7. Easy to track trends.	
8. Development costs are shared.	
9. Shared information can be the first step to sharing other resources.	
10. Good utilization of computer resources.	

Alternative No. 4 – Central Hardware and Decentralized Systems and Programming Staff

Basic advantages	Basic disadvantages
1. Low hardware costs and overhead.	1. High overall staffing cost.
2. Agencies have access to larger computer than they could ordinarily afford.	2. Difficult to have variety of skills on staff.
3. Good utilization of computer resources.	3. Tends toward duplication of effort.
4. Available information from County-wide data bases.	4. Hardware problems affect all agencies.
5. Agencies have more flexibility in setting priorities.	5. May have problems meeting schedule commitments due to communications problems (both electronic and human) and individual contention for hardware resources.
6. Development staff may have a firmer understanding of local district needs.	

Alternative No. 5 – Central Hardware, Central Maintenance Staff and Decentralized Development Staff

Basic advantages	Basic disadvantages
1. Low hardware costs and overhead.	1. High overall development costs.
2. Agencies have access to large computer.	2. Difficult to staff for necessary mix of skills.
3. Each agency has more control over its data processing priorities.	3. Difficult maintaining standards and communications between maintenance and development.
4. Development staff has firmer understanding of individual agency problems.	4. Tends to result in duplication of effort.
5. Efficient utilization of computer resources.	5. Contention for hardware resources.
	6. Scheduling problems.
	7. Hardware problems affect all users.
	8. Users will complain about the methodology and equitability of accounting and billing for central service.

Alternative No. 6 – Central Hardware, Some Central Staff and Some Separate Staff

Basic advantages	Basic disadvantages
1. Low hardware costs and overhead.	1. High staffing cost.
2. Agencies have access to larger computer than individual budgets would permit.	2. Some duplication of effort is possible.
3. Good utilization of computer resource.	3. Some contention for resources.
4. Some Countywide data bases available to agencies.	4. Some potential scheduling problems.
5. Each agency has some flexibility in setting data processing priorities.	5. Hardware problems affect all users.
6. Some data processing staff have firmer understanding of local agency problems.	6. Users will complain about the equity and methodology of accounting and billing for central service.

Remote Job Entry (RJE)

Basic advantages	Basic disadvantages
1. Gives each agency immediate access to central computer from agency site. 2. Output is printed at agency site 3. Changes and errors in data can be corrected more quickly.	1. High dependence on communications. 2. Central hardware problems affect all users. 3. High hardware costs. 4. High personnel costs.

Minicomputer

Basic advantages	Basic disadvantages
1. Each agency has some form of independent as well as central capability. 2. If central hardware has problems, "mini" can act as partial backup. 3. Data can be edited and reformatted at remote site. 4. Helps optimize utilization of central computer hardware.	1. High hardware costs. 2. High personnel costs. 3. High duplication of effort (unless a system of sharing is worked out). 4. Requires separate policy governing use of "mini" versus central computer.

Comparative Factors

In developing a set of comparative characteristics for the analysis of alternatives, we developed two major divisions: quantitative factors and qualitative factors. Quantitative factors consist of one-time costs and recurring costs. Recurring costs include hardware lease, personnel costs including fringe benefits, building lease, utilities, supplies, and ongoing professional education. One-time costs consist of shipping costs for equipment, disk pack purchase, site preparation, one-time education, conversion costs (contract) and supplementary personnel for system development.

Qualitative factors are control, responsiveness (to current and future needs), duplication, potential for management information systems, data processing personnel development, and resource development. These factors include:

- *Control* – To what degree can each agency determine the direction of data processing emphasis or growth? Can each agency decide what and when it desires and wants from data processing?
- *Responsiveness (Current Needs)* – Can the varying needs and desires of individual users be readily satisfied? What is the ability to respond to immediate requests?
- *Responsiveness (Future Needs)* – How flexible is the alternative? What is its capability for future growth? Will future growth require major changes in data processing systems or has this been planned for?
- *Duplication* – How efficient is the overall data processing system? Is there a maximum utilization of resources? Does this alternative lend itself to sharing – are records (e.g., interdistrict student transfers) compatible enough to be transferred between agencies with no apparent effort?
- *Potential for Management Information Systems* – Does the alternative have the capability to provide high level policy information (as opposed to operational information)? Can this information be a vital planning tool for building future models?
- *Data Processing Personnel Development* – Does the alternative provide a career path for data processing personnel? Will there be professional challenges and educational opportunities? Is there an opportunity for professional growth?

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COMPARISON OF

	QUALITATIVE				
ALT. NO.	CONTROL	RESPONSIVENESS – CURRENT NEEDS	RESPONSIVENESS – FUTURE NEEDS	DUPLICATION	POTENTIA MANAGE INFO. S
①	Each agency has complete control within the limitations of its capabilities Greatest individual control.	Can respond immediately to all requests if they are within agency capability, resources and D.P. policies.	Agencies do not have capability to meet all their future needs. Least responsive.	Greatest amount of duplication exists. Least conducive to record sharing.	Least poten to limitation individual re
②	Least individual control. Must function thru a committee.	Greatest resources available to user, but also greatest contention for some resources. Least responsive for "immediate" turnaround.	Greatest potential for long range planning and future directions.	Least duplication. Most efficient utilization of available resources.	Highest pot for providin level inform planning mo
③	District controls their own applications, but hardware and personnel are controlled thru committees.	Responsive on regularly scheduled programs. "One Shot" emergencies must go through a priority review.	Has capability to respond to future needs if agencies will agree on common needs.	Much duplication of effort and inefficient utilization of equipment.	Capability depending thrust of in district app
④	Second greatest amount of individual district control.	Can be extremely responsive to user needs within schedule of hardware availability.	Can be responsive but requires extensive agency planning. Extent of data base is limited.	Must duplication of effort and inefficient utilization of equipment.	Limited po for MIS, al hardware c exists.
⑤	Some control, thru separate development staff and separate applications.	Can be extremely responsive to user needs within schedule of hardware availability.	Can be responsive but requires extensive agency planning. Extent of data base is limited.	Much duplication of effort and inefficient utilization of equipment.	Limited po MIS, altho capability
⑥	Control over those applications that are separate. Committee controls common applications	Can be extremely responsive to user needs within schedule of available resources.	Second greatest potential for long range planning and preparation for future directions.	Limited duplication. Second most efficient utilization of resources.	Second hig potential f based on c data bases applicatio

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ON OF ALTERNATIVES

			QUANTITATIVE			
OTENTIAL FOR MANAGEMENT INFO. SYS.	DATA PROCESSING PERSONNEL DEVELOPMT.	RESOURCE AVAILABILITY	ONE-TIME COSTS		RECURRING COSTS	
ast potential due limitation of lividual resources.	Personnel have the least opportunity for education and advancement	Minimum resources available.	NONE		2,468,873	
ghest potential providing policy el information and nning models.	Best opportunity for career advancement and education. Will attract most qualified personnel.	Greatest combination of resources is available.	Total	223,000	Batch	2,096,056
			Less Present Equipment	-325,000	RJE	2,342,198
			Net	(-102,000)	Mini	2,495,498
pability for M.I.S. pending on future ust of individual trict applications	Good opportunity for advancement but personnel cannot take advantage of available resources.	Good availability of resources, but they are not used to their best advantage.	Total	425,000	Batch	2,281,596
			Less Present Equipment	325,000	RJE	2,527,738
			Net	100,000	Mini	2,681,038
nited potential MIS, although dware capability sts.	Limited opportunity for career development.	Good hardware capability, but none of resources are used most effeciently.	Total	425,000	Batch	2,303,032
			Less Present Equipment	325,000	RJE	2,549,174
			Net	100,000	Mini	2,579,211
nited potential for S, although ability exists.	Limited opportunity for career development for agency development staff. Central maintenance group has good career opportunity.	Good hardware availability, but none of resources are used most efficiently.	Total	425,000	Batch	2,401,315
			Less Present Equipment	325,000	RJE	2,647,457
			Net	100,000	Mini	2,800,757
ond highest ential for MIS ed on common a bases and lications.	Good opportunity for career advancement for central staff. Limited opportunities for decentralized staffs.	Good availability of resources. Second best utilization of resources.	Total	334,000	Batch	2,283,669
			Less Present Equipment	325,000	RJE	2,529,811
			Net	9,000	Mini	2,683,111

- *Resource Availability* – What level of hardware, software and personnel skills are available to each agency?

A summary of the qualitative and quantitative factors is illustrated on the facing page.

SPECIAL STATEMENT

In applying the test of economic feasibility to all the alternatives, we discovered that it would *not* be economically feasible for Grant Joint Union High School District to be a participating member of a consolidated data center under Alternative Nos. 3, 4 and 5. Under those alternatives, Grant would be better served (cost-effectively) as a user of another participant in the consolidated center (e.g., County Regional Center). However, under Alternative Nos. 2 and 6, Grant could pass the test of economic feasibility as a participant in a consolidated data center.

CONCLUSION

Based on our fact-finding and analysis, we do not believe that immediate consolidation would be either economically or technically feasible. However, based upon a five-year projection of the agencies' needs and resources, several forms of consolidation are both economically and technically feasible.

EXHIBITS

Exhibit A

SENATE BILL NO. 804

CHAPTER 1167

An act relating to data processing services, making an appropriation therefor, and declaring the urgency thereof, to take effect immediately.

(Approved by Governor October 2, 1973. Filed with
Secretary of State October 2, 1973.)

LEGISLATIVE COUNSEL'S DIGEST

SB 804, Rodda. Data processing services.

Appropriates from the General Fund $70,000 to the Superintendent of Public Instruction for purposes of undertaking a study by an independent consulting firm in a county selected by the Superintendent of Public Instruction, re the feasibility of combining existing data processing centers presently operating in at least 4 school districts and the office of the county superintendent of schools.

Requires selected consulting firm to report within 6 months to the participating school districts, county board of education, and the Superintendent of Public Instruction.

To become operative on July 1, 1973.

Provides that specified requirements of Budget Act of 1973 relating to electronic data processing equipment are not applicable to initial lease of equipment and initial acquisition of services and supplies for Stephen P. Teale Consolidated Data Center.

Provides that Business and Transportation Agency may obtain such equipment, services, and supplies from one or more vendors under specified conditions.

Provides that in considering bids, a separate contract or contracts may be entered into for program conversion of Department of Motor Vehicles, other state agencies, and other materials relating to initial procurement for Stephen P. Teale Consolidated Data Center.

To take effect immediately, urgency statute.

The people of the State of California do enact as follows:

SECTION 1. The Legislature finds that in certain counties in California there exist numerous independent school district data processing centers that service the identical needs of thousands of students.

It is the intent of the Legislature that a study be undertaken to determine the feasibility of combining services of existing data processing centers, in a county of appropriate size and diversity selected by the Superintendent of Public Instruction, where at least four school districts within the county and the county superintendent of schools presently operate their own computer centers, and to provide accessibility to a major computer center.

SEC. 2. The study shall be undertaken by a recognized consulting firm that has met criteria of objectivity, prior experience, and personal knowledge of data processing services, which shall be selected by the Director of Finance in consultation with the governing bodies of the selected county and school districts therein.

SEC. 3. The consulting firm selected to report shall respond to the following:

(a) Identification of similarities and differences of policies and goals of the existing district and county superintendent of schools operations.

(b) Identification of similarities and differences in operations and services of the data processing centers.

(c) In the areas of education, administration and business, determine the long-range goals for electronic data processing.

(d) Provide an analysis of various alternatives in the field of data processing to achieve the goals reported in subdivision (c) of this section.

SEC. 4. The consulting firm shall complete its report and prepare its findings within six months of the notification to proceed.

SEC. 5. The findings of the consulting firm shall be reported to the participating school districts, the county board of education, and the Superintendent of Public Instruction. The Superintendent of Public Instruction shall meet with the participating school districts and county superintendent of schools and certify the study complete.

SEC. 6. The Superintendent of Public Instruction in a management review shall report the action taken to the Assembly Efficiency and Cost Control Committee and the Senate and Assembly Education Committees, if the report concurs in a feasible combination of service to attain the goals of the participants.

SEC. 7. There is hereby appropriated from the General Fund to the Superintendent of Public Instruction the sum of seventy thousand dollars ($70,000) for expenditure and allocation for the purposes of this act.

SEC. 8. This act shall become operative on July 1, 1973.

SEC. 9. Notwithstanding the provisions of Item 79.1 and Section 4 of the Budget Act of 1973, the prohibition that no expenditures or encumbrances shall be made from funds appropriated in the budget act or from any other source for the lease, lease-purchase or purchase of electronic data processing equipment unless two bidders bidding on mainframes manufactured by different companies have been determined to be qualified for contract award in accordance with the act shall not be applicable to the initial lease of equipment and the initial acquisition of services and supplies for the Stephen P. Teale Consolidated Data Center. The Business and Transportation Agency may obtain from one or more sources such equipment, services and supplies by negotiation with vendors seeking consideration and award the contract pursuant to such negotiation if such award is determined to be in the best interests of the state. The Business and Transportation Agency need not negotiate with vendors who do not seek consideration on or before October 15, 1973. In considering bids a separate contract or contracts may be entered into for the conversion of programs for the Department of Motor Vehicles, or any other agency, and for all other equipment, supplies and services pertaining to the initial procurement for the Stephen P. Teale Consolidated Data Center. The Business and Transportation Agency shall not use a conversion date for programs in any state department prior to July 1, 1974, or within six months after award of the contract, whichever is later, to preclude any potential vendor from negotiating for or receiving an award under this act.

SEC. 10. This act is an urgency statute necessary for the immediate preservation of the public peace, health, or safety within the meaning of Article IV of the Constitution and shall go into immediate effect. The facts constituting such necessity are:

Various school districts and county superintendents of schools throughout the state are presently expending vast sums of money operating their own data processing centers. Such operations are resulting in a duplication of services and cost. In order to assess the amount of duplication involved and the feasibility of combining such operations at the earliest possible date, it is necessary that this act take effect immediately.

Exhibit B

DATA CENTER MANAGEMENT INTERVIEW

District: ______________________________

Interviewee: ______________________________

Time in present position: ____________________

General philosophy and direction:

Administrative versus instructional utilization (applications):

Relations with users (how, who, when, by whom, why, where – user satisfaction survey):

How are user requests handled (feedback):

What is the development cycle:

Maintenance versus changes:

Identification of needs:

How:

Who:

When:

Where:

Priority:

What:

Future plans (why):

On-line:

CAI/CMI:

New applications:

Reworking applications:

Other:

Relation of needs to future plans:

In-house education:
    Philosophy:

Exhibit C

APPLICATION REVIEW FORM

Please return by July 15, 1974

District name: ______________________________

Filled out by (print): ______________________________

Name of application:

Functional purpose:

Agency impact:
How is this application used:

Is the application still accomplishing its original purpose:

Comment on the degree of user satisfaction:

When were users last checked with:

How:

What other applications would be affected if this application were changed? Destroyed?
How:

What language is application written in:

When was application initially designed: For what machine:

In which language:

When was the last major redesign (not addition): On what machine:

Input:
In what form is the input (e.g., card, tape):

What are the data elements:

Who is responsible for its origination:

How flexible is the format on the input document:

Files:

What files are used:

What is the files organization:

What are the principal data elements:

How flexible are file formats (can they be run with blank elements?):

Reports:

In what form are the reports (e.g., 3-part paper, ditto master):

What data elements do they contain:

Who receives reports:

How do they use reports:

What controls are used (both user and D.P.):

Who is responsible for controls:

How often is this application run:

What is the average run time:

How much maintenance is required (in man-days per year):

What is the total number of changes that have been made to this application:

What are planned future changes (and/or rework) and tentative dates (both start and completion):

What are core and peripheral requirements of the largest program:

Exhibit D

AGENCY ADMINISTRATORS PARTICIPATING IN LONG-RANGE PLANNING SERVICES

School district/officer	Position
Grant Joint Union High School District:	
Edward T. Walsh	Superintendent
George W. Badella	Assistant Superintendent, Instruction
Ira S. Carter, Jr.	Assistant Superintendent, Business
Ed Miyasaki	Data Processing and Business Manager
Los Rios Junior College District:	
Dr. George Rice	Superintendent
Dr. Leadie M. Clark	Assistant Superintendent, Instruction
J. A. Misfeldt	Assistant Superintendent, Business
Leo Day	Data Processing Manager
Sacramento City Unified School District:	
Joseph H. Lynn	Superintendent
Herman Pede	Assistant Superintendent, Business
Dr. Rex Kircher	Assistant Superintendent, Elementary Education
William J. Morgan	Assistant Superintendent, Secondary Education
Dr. Kimball Salmon	Administrator, Special Programs
Tom Sumida	Director, Electronic Data Processing
Sacramento County Schools:	
Leo Palmiter	County Superintendent of Schools
Dr. Dale Moore	Deputy Superintendent
Richard M. Henderson	Director, Regional Education Data Processing Center
San Juan Unified School District:	
Dr. Ferd J. Kiesel	Superintendent
Dr. Les Glaspey	Assistant Superintendent, Business
Cornelia Whitaker	Director of Curriculum
Robert Whitaker	Director, Data Processing

APPENDIX A

GLOSSARY

Appendix A

GLOSSARY

Applications – A specific activity, set of instructions and generated reports to be accomplished by the user and data processing.

Batch Processing – A systematic method of collecting data on some form external to the computer (scan sheet, cards, etc.) and data so collected grouped into batches and processed through the computer at predetermined times, usually at regular intervals.

COBOL – COmmon *B*usiness Oriented *L*anguage is a high level computer language resembling abbreviated, well defined English statements in which business-oriented computer programs are commonly written. The computer program that interprets this language into a set of instructions by which the computer operates is furnished by the computer vendor to make the hardware more readily useful to the client.

CAI – Computer *A*ssisted *I*nstruction is a teaching system in which students have direct access to the computer hardware interacting with preprogrammed instructions with the computer.

CMI – Computer *M*anaged *I*nstruction is a system in which the computer is used to furnish instructional information to the student and classroom teacher to aid the teacher in making instructional judgments with respect to the individual child.

Common System – Common system in the complete sense means the common use of hardware, programming and operational staff and like applications by all users. The common use in any one or more of these areas does not preclude variations in the remaining areas.

Data Base – A predetermined, well defined array of information stored in a computer that may be accessed and summarized in any manner useful to the user.

Data Communication Systems – A system by which data is transmitted to a computer by a remote electronic device.

Demographic – Data that pertains to population statistics.

Diagnostic/Prescriptive Techniques – An instructional technique that consists of the diagnosing of student strengths and weaknesses with provision for individualized prescriptive corrective measures designed to overcome these deficiencies.

Direct Access – A means of communicating with a computer by which the user is able to interrogate, delete, or add to the information on computer file with negligible time delay.

File – A collection of related data records.

Flowchart – A diagram which describes the flow of information associated with an application. Inherently, the flowchart depicts the interrelationships among the components of the application.

FORTRAN – *FOR*mula *TRAN*slation is a high level computer language, standardized in the industry, resembling mathematical symbols in which scientific or mathematical computer programs are written.

Functional Compatibility – Similar characteristics of goals, objectives, and methods which allow for the development of common data processing systems.

Hardware – That component of a data processing system that consists of physical equipment, as opposed to computer programs or methods, which are referred to as software.

K – One thousand; often used in describing the size of the storage capabilities of a data processing unit. For example, 32K indicates the capability of storing 32,000 units of information.

Longitudinal Studies – Studies designed to span a multiple time period, usually more than one year, in order to examine the effects of an instructional program over a relatively long time period, as opposed to the examination of data for a one-year instructional period in which basic conditions remain identical.

Memory – Synonymous with computer storage of the central processing unit of the computer (storage size – see "K").

Microfiche – Miniaturized photographic card on which multiple pages of information are stored, which alleviates storage problems, and facilitates quick access to data.

Model – A simulated system designed to meet known or assumed conditions in order to project needs or to alleviate procedural problems when developing an application.

Multiprocessing – The technique whereby two or more computer programs operate in the computer at the same time.

Needs Assessment – The collection of data to obtain information concerning the needs of the district.

On-line – Pertains to equipment or devices under the control of the central processing unit and which enables the user to interact directly with the computer.

Programming Language – A symbolic language in which programming personnel encode a computer program.

Program – A series of step-by-step instructions by which the computer operates.

Record – A collection of related items of data treated as a unit, for example, all of the stored information items about an individual student may be a record (see file).

Simulation – The process of representing behavioral features and conditions of a physical or abstract system in designing a model representing the interrelationships of the elements of the system and usually resulting in predictive capabilities.

Software – That component of a data processing system that consists of computer programs as opposed to the physical equipment (hardware).

Source Data – Information originating from the user needed for a specific application.

Turnaround Time – The lapse of time between the user and the furnishing of source data to the computer and receiving processed data from the computer.

APPENDIX B

APPLICATIONS

APPLICATIONS

This section contains five basic types of information:

1. "Flowcharts" that depict the logical interrelationships between systems, or systems flow of an application that must be developed. These charts are not meant to be a detailed reflection of present applications. Rather, they represent the overall flow and integration that agencies must look to (regardless of whether they are consolidated or running separate systems) to meet the goals they set for themselves.

2. Narrative descriptions relating to the flowcharts.

3. Narrative descriptions and/or matrices of what some of the present systems are, some commonalities and differences between agencies.

4. Ratings of the commonality potential for each major system discussed in this section.

5. Listing of the major common applications relating to the various subsystems. These listings indicate frequency of use, average run time, hardware requirements and the files they are dependent upon. This section only reflects the major systems presently in use by more than one agency.

While there are comments in this section stating that some applications lend themselves to consolidation and others do not, it should be noted that everything could be consoldiated if mandated; however, the impact and effects on individual agencies' morale, and present methods of "doing business" reaches beyond data processing. (For example, if the financial systems were to be consolidated, the first task, before data processing was involved, would be the joint development of a common chart of accounts, as all of the present charts are quite different.)

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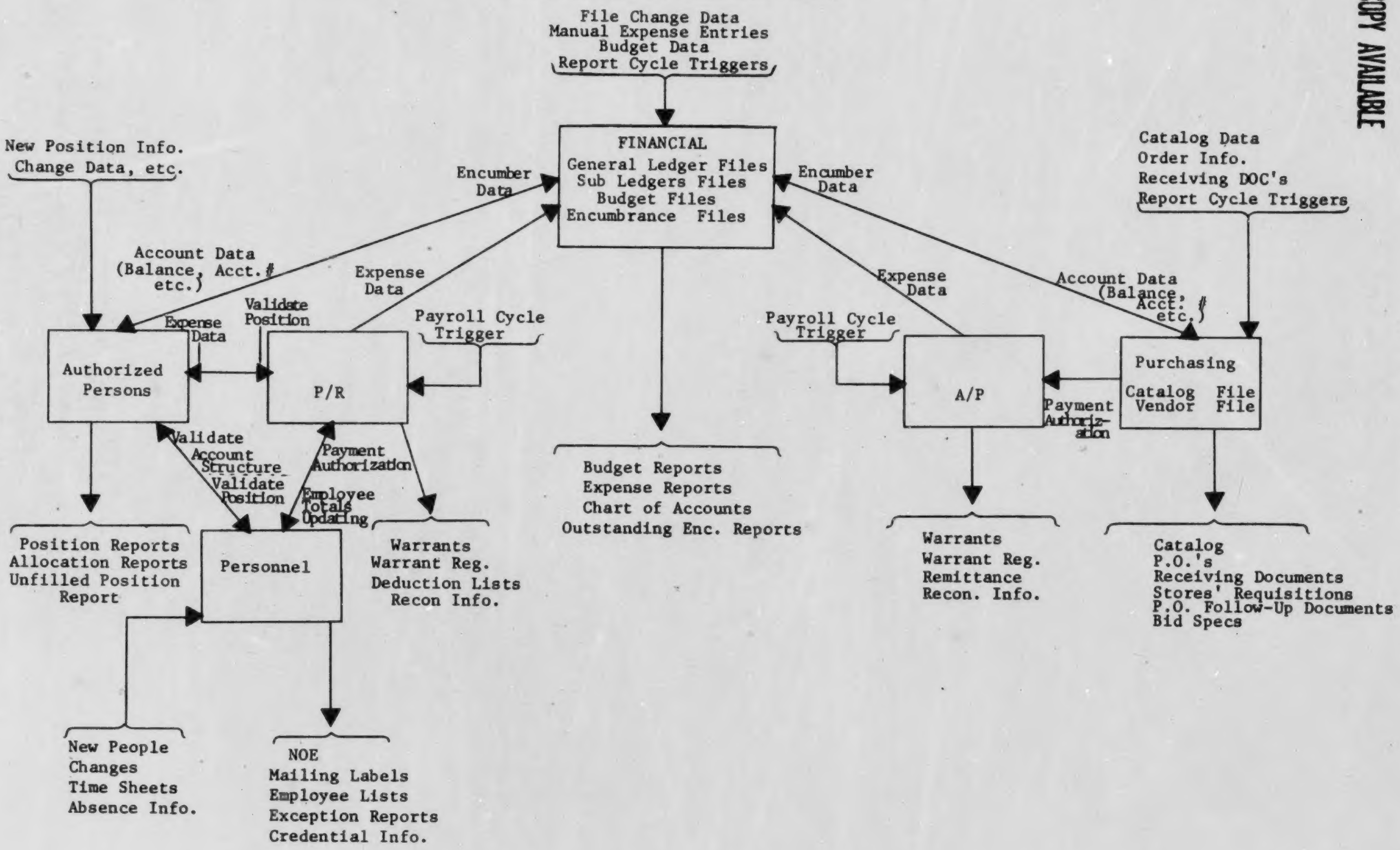
INTERRELATIONSHIP OF FINANCIAL SYSTEMS


File Change Data
Manual Expense Entries
Budget Data
Report Cycle Triggers
FINANCIAL
General Ledger Files
Sub Ledgers Files
Budget Files
Encumbrance Files
Budget Reports
Expense Reports
Chart of Accounts
Outstanding Enc. Reports
New Position Info.
Change Data, etc.
Encumber Data
Account Data (Balance, Acct.# etc.)
Expense Data
Validate Position
Expense Data
Payroll Cycle Trigger
Authorized Persons
P/R
Validate Account Structure
Validate Position
Payment Authorization
Employee Totals Updating
Position Reports
Allocation Reports
Unfilled Position Report
Personnel
Warrants
Warrant Reg.
Deduction Lists
Recon Info.
New People
Changes
Time Sheets
Absence Info.
NOE
Mailing Labels
Employee Lists
Exception Reports
Credential Info.
Encumber Data
Expense Data
Account Data (Balance, Acct. # etc.)
Catalog Data
Order Info.
Receiving DOC's
Report Cycle Triggers
Payroll Cycle Trigger
A/P
Payment Authorization
Purchasing
Catalog File
Vendor File
Warrants
Warrant Reg.
Remittance
Recon. Info.
Catalog
P.O.'s
Receiving Documents
Stores' Requisitions
P.O. Follow-Up Documents
Bid Specs

FINANCIAL SYSTEM

The financial system consists of two main portions: one is the main accounting files (mainly general ledger and its subledgers) and the other consists of subordinate financial applications that may occasionally feed data to the main files (such as budget planning, revenue projections, etc.) and stand-alone applications not related in any way to the main files (for example, student activity accounting).

The input to the financial system consists of manual entries (change and correction transactions, expense transactions, budget parameters, etc.) and data generated by activity in other systems within the business system (encumbrance data from the purchasing system, payment data from accounts payable and payroll systems, etc.).

The output of the financial system, in addition to the normal update audit and exception reports, would consist of such things as budget planning reports (state object code and program formats, etc.), expense detail and summary reports, outstanding encumbrance lists, accounts receivable billing forms, income accounting status reports, student activity balance reports, cafeteria profit and loss statements, property records lists, etc.

Student Enrollment Projections

Apparent opportunity exists for a shared enrollment projection application for the following reasons:

- The agencies generally use the same methodology, i.e., cohort survival with some demographic data.
- The grid pattern type demographic format could be used by all agencies more efficiently.
- The junior college *needs* the information developed by the K-12 or high school districts.
- A broader application, i.e., a program covering a larger geographic area, could provide more information on interdistrict movement; and, in the case of the junior college, the relationship between demographics and campus selection.
- The combined experience of all the agencies would provide better (more valid) statistical data for the formula factors used in the projection.

The office of research and planning for the L.A. Community College District has reportedly developed an enrollment projection system which integrates the life spans for projections at all levels. A common application could probably also be used by Sacramento State.

Income Projections

Another area conducive to common applications is income projection, since the majority of income is based on two factors: (1) assessed valuation and resultant property taxes, and (2) enrollment and the State apportionment by ADA. The junior college district would require different applications due to the fact that its computations are based on SB 6 rather than SB 90, and an apportionment based on WSCH rather than ADA.

Housing (Facilities) and Capital Outlay

Facilities and capital outlay appear to be a subjective area in planning, but could readily use common applications in the execution.

In planning, the agencies generally have "educational specifications" which provide for certain space and facility allowances per student by the various life spans. Some commonality occurs where they are borrowing State funds for construction; in this event funds are provided on the basis of certain dollars per square foot per grade level.

In execution, the agencies could all use project management and control systems similar to PERT or CPM.

Operating Expense Projections

Salaries and supplies are the biggest elements and are based on many different criteria; consequently, this application would be very complicated. For example, the projections of various staffing levels may be based on:

- Enrollment by grade level
- Numbers of schools
- Square feet
- Acres of grounds
- Teachers
- Many combinations of the above.

In addition, the factors may be expressed as numbers or dollars allowed.

To use a common system, the agencies would have to first agree upon a common basis for projections.

INTER-RELATIONSHIP OF BUSINESS APPLICATIONS IN ACCOUNTING

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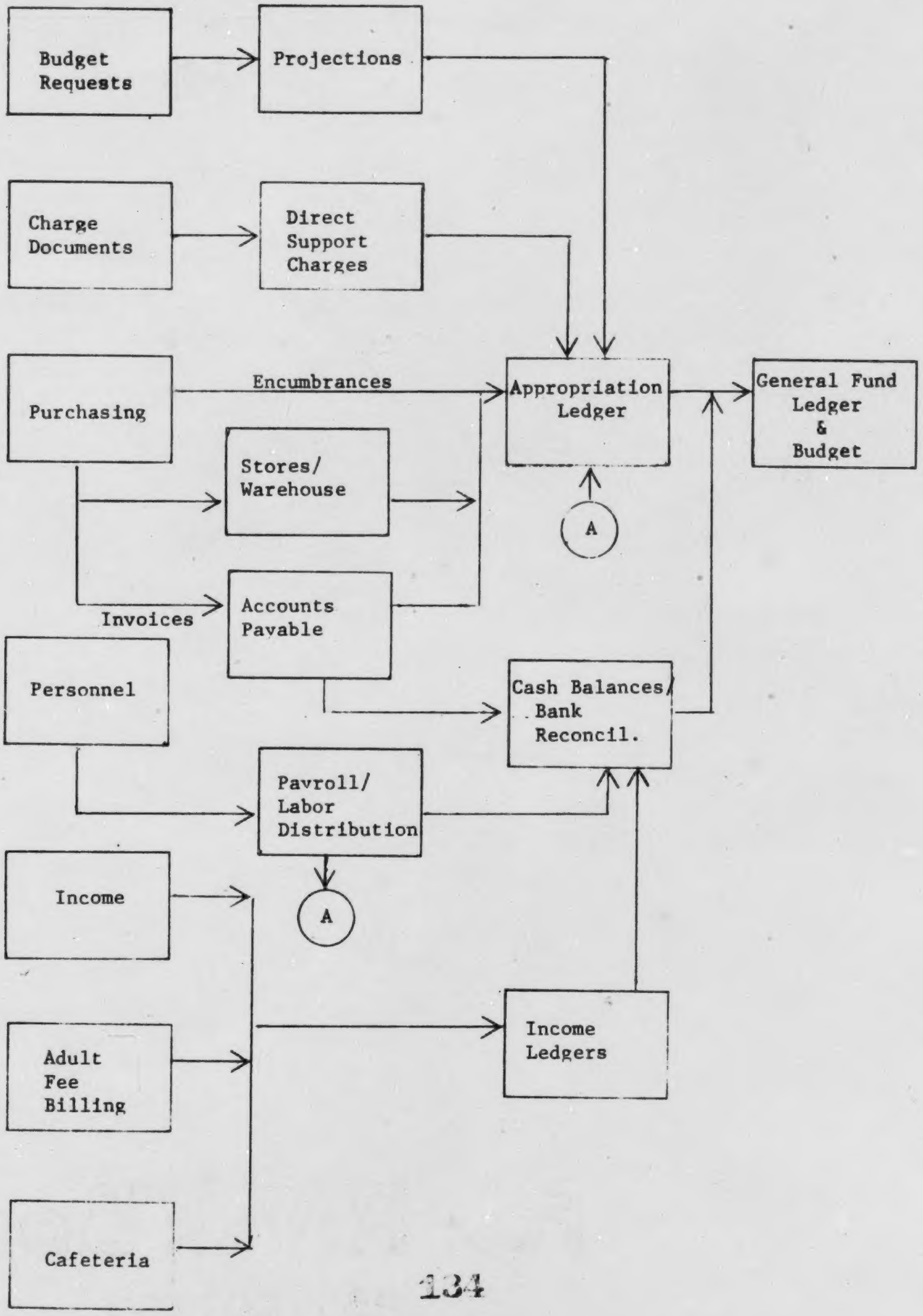

Budget Requests
Projections
Charge Documents
Direct Support Charges
Purchasing
Encumbrances
Appropriation Ledger
General Fund Ledger & Budget
Stores/ Warehouse
A
Invoices
Accounts Payable
Personnel
Cash Balances/ Bank Reconcil.
Payroll/ Labor Distribution
A
Income
Adult Fee Billing
Income Ledgers
Cafeteria

Budget Tabulation

This application can range from a simple tabulation of manual budget input to a complex projection of the budget with historical files for comparison.

The simple application could be used commonly since the budget is merely formatted and printed from manual input. The format may vary.

The more complex budget preparation applications would be very difficult because different "budget policies" (or formulas) are presently required for each agency. If they could agree on common policies, common systems could be implemented.

Cost Accounting/Appropriation Balances

Large variations among the agencies occur in the accounting systems used by the agencies due to the organizational level at which the budget is prepared, cosigned and controlled.

Agencies may budget and report costs at any of four major levels:

1. *Agencywide* (no identification of life spans or locations)
2. *Life Span* – i.e., elementary, intermediate, secondary (no location identification)
3. *School* – i.e., each site assists in preparation and has control of some portion of budget
4. *Department/Program* – responsibility for budgeting and controlling certain expenditures is delegated to department head level.

These levels represent the degree to which budget management is decentralized in a given agency; however, each of the agencies reviewed in this study budgeted their various objects of expenditure at several levels. For example, Grant budgets and reports salaries and retirement benefits by school, but health and welfare benefits districtwide. On the other hand, San Juan budgets and reports salaries by life span and all benefits districtwide, breaking benefits down by life span manually.

Cost Accounting

Various levels of budgeting and reporting could be accommodated in a common system; however, all of the current systems appear inadequate for lack of capability in the following areas:

- Direct cost allocations to program level
- Direct support interprogram charges (the County has this capability).

In addition, variations in responsibility for support program activities could cause some complications in that some departments, such as maintenance and/or operations, are split organizationally.

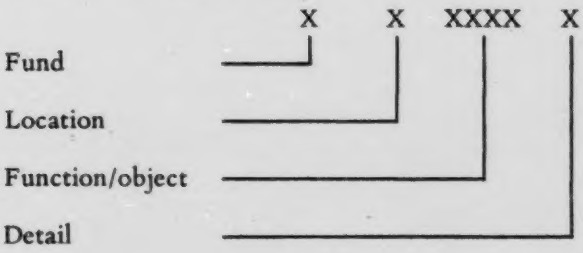
The largest discrepancy which would have to be resolved is the variation in each agency's chart of accounts. We have included in the one-time costs for all common application alternatives, the cost of contracting for the development of a common chart of accounts.

Chart of Accounts Format

	Grant Union	Los Rios	Sacramento City USD	Sacramento County Office of Education	San Juan
Fiscal year					
Fund		XX	X	X	XX
General ledger (trans)				XX	
Bank/income Source		AXX			
County location				XX	
District location				XX	
School location	XX	A	XXX	XX	XXX
Function		AXXX			XX
Department		X	XXX		XXX
Program	XX	XX	A	XX	
Detail	XX			XX	
State object	XXXX	XXXX	XXXX	XXXX	XXXX
Detail		AXX			XX
Reference		XXXXX.XX(1)			

X = Numeric
A = Alphanumeric

(1) Cross-reference code to old system:



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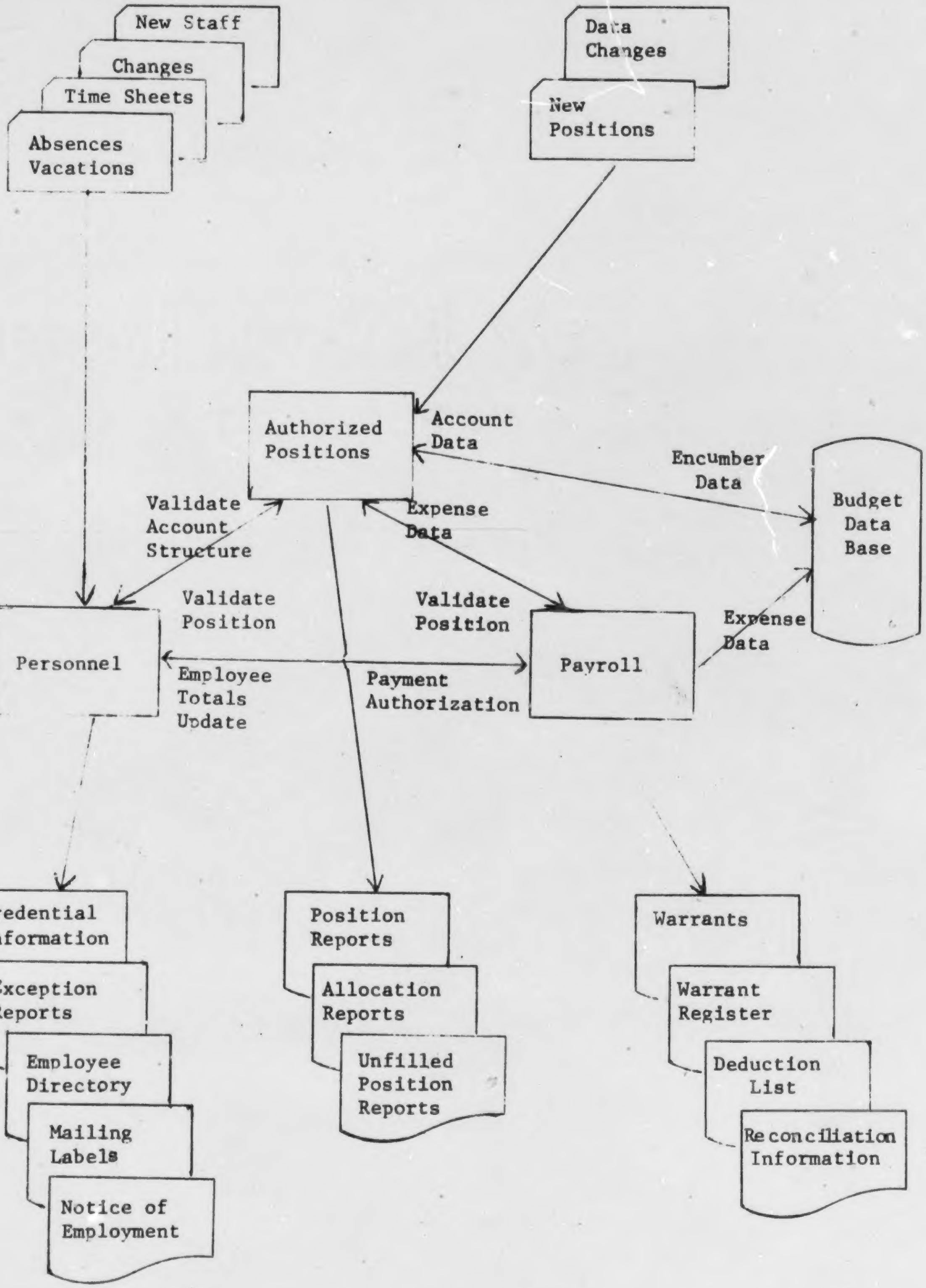
PAYROLL/PERSONNEL


New Staff
Changes
Time Sheets
Absences Vacations
Data Changes
New Positions
Authorized Positions
Account Data
Encumber Data
Budget Data Base
Validate Account Structure
Expense Data
Validate Position
Validate Position
Personnel
Payroll
Expense Data
Employee Totals Update
Payment Authorization
Credential Information
Exception Reports
Employee Directory
Mailing Labels
Notice of Employment
Position Reports
Allocation Reports
Unfilled Position Reports
Warrants
Warrant Register
Deduction List
Reconciliation Information

PERSONNEL

The personnel file is, understandably, the source of all employee data and can contain as much or as little information as desired within obvious limits. When properly coded, the personnel file is used to drive the automatic payrolls and will accommodate exception or supplemental payrolls. An input verification procedure may be in the form of turnaround documents or actual on-line updating.

An almost infinite series of reports can be made available, among which might be notice of employment, employee lists, mailing labels, exception reports, credential information, etc. A reliable report generator might be put to good use here.

Authorization System

The authorization system is intended to perform the dual functions of employment position control and encumbering of regular employee salaries. (If neither function is desired, the authorization system is not required.) The authorization control file contains an authorized position record for each regular position available within a district. The authorized position record contains such information as the person in this position (if any), the beginning and ending employment dates for this position, the expected salary for an unfilled position (for cost projections), the position title, etc.

Input to the authorization system would consist of information such as new position data, changes to existing positions, filling of vacant positions, expense data required to reduce the outstanding encumbrance, etc.

Output from the authorization system would include authorized position lists, allocation lists, unfilled position reports, validation information to the payroll and personnel systems, etc.

Payroll System

The payroll system calculates the payment amounts for all those employees selected from the personnel file based on the payroll cycle trigger.

Input to the system is the personnel file.

Output from the payroll system consists of reports (warrants, warrant registers, deduction lists, etc.), expense data for the financial system, employee amounts used to update year-to-date and other totals in the personnel file, payroll transaction records sent to the payroll history file, etc.

Among the problems which must be overcome to move toward common payroll systems are the following:

- One agency will be using a direct money transfer for a portion of its payroll by magnetic tape to a bank.

- One agency has an additional fringe benefit feature allowing employees to apply a certain portion of the agency share to any benefit in any amount not to exceed the allowance.
- Personnel management reports, beyond a few standard ones, vary widely in each agency.
- One agency allows "in-service growth" credits for its classified personnel, increasing their pay with continuing education.
- One agency now has an additional employee benefit called deferred compensation.
- One agency withholds deductions from some of its bimonthly paid employees only once per month.
- Provision must be made for issuing emergency checks at the agency if an employee does not receive a paycheck.
- Common check preparation may cause timing problems for cutoffs, etc.

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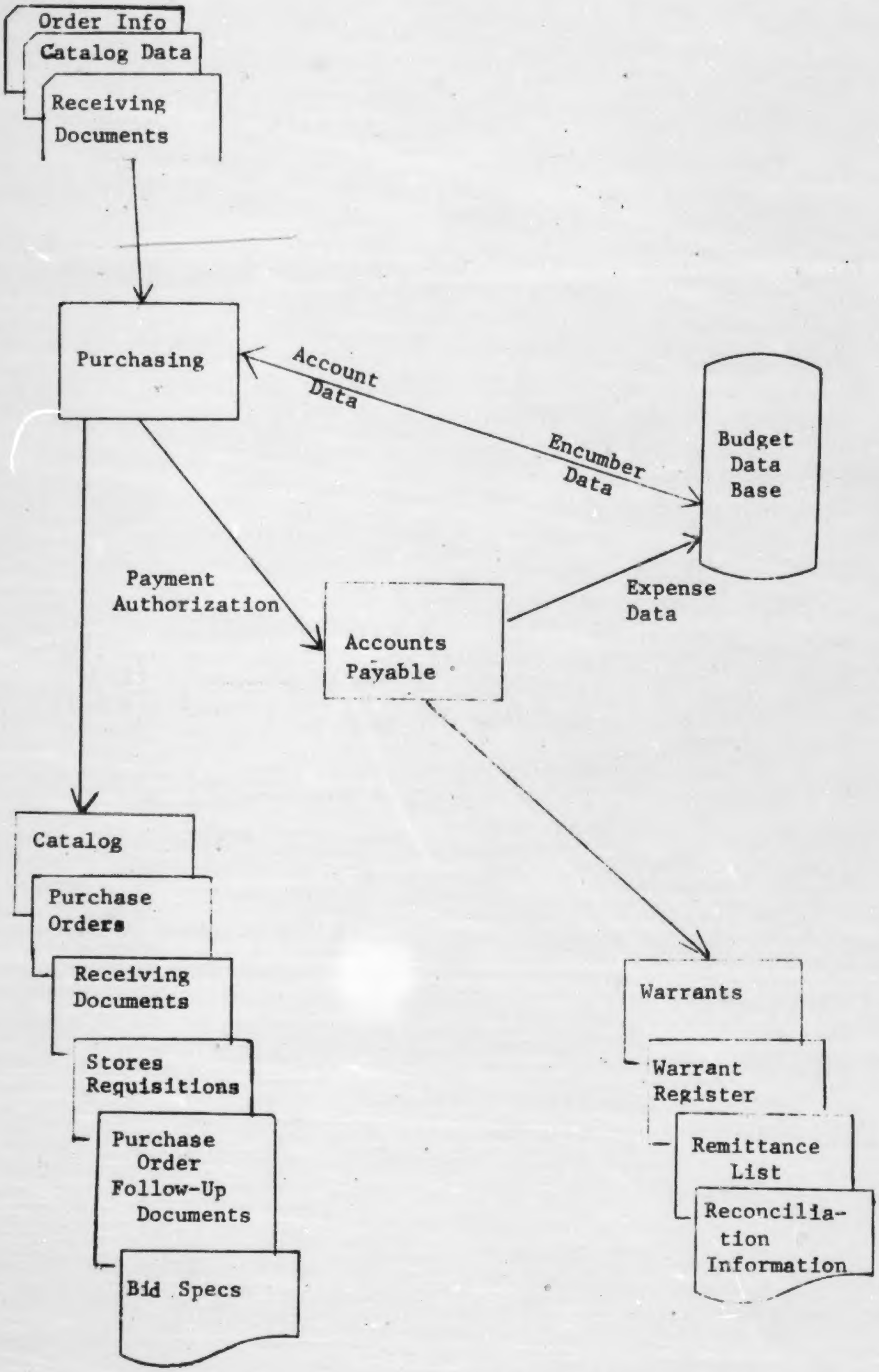
PURCHASING/PAYABLES


Order Info
Catalog Data
Receiving Documents
Purchasing
Account Data
Encumber Data
Budget Data Base
Payment Authorization
Accounts Payable
Expense Data
Catalog
Purchase Orders
Receiving Documents
Stores Requisitions
Purchase Order Follow-Up Documents
Bid Specs
Warrants
Warrant Register
Remittance List
Reconciliation Information

PURCHASING

From a catalog of all items used in the agency including, but not limited to, stores, the user selects the desired item by referencing the printed catalog or terminal display, and entering the quantity and account number. The system determines if the item is warehoused in the agency. If so, it produces a stores requisition; if not, a purchase order or bidding information is sent to the purchasing office.

Interrogation of the financial system for account balances can be made to suppress issuance of purchase orders or requisitions due to insufficient funds. Encumbrances are generated and sent to financial files.

All normal stores inventory functions are performed: on-hand totals, pricing, order points, summary data, etc.

Purchase order follow-up functions are performed including aging, partial receipt, and cancellation. Upon receipt, pay authorization is forwarded to the accounts payable system.

Purchasing applications are currently limited in the agencies. The vendor file is used primarily for accounts payable rather than for management information to assist purchasing in evaluating and selecting appropriate vendors.

All of the agencies consider the vendor file difficult to maintain and have control groups in purchasing or accounts payable who control the issuance of numbers and work to eliminate duplications and errors.

A common vendor file would pose potential difficulties with each agency by

- adding the same vendor in different formats,
- using the same vendor at different addresses, and
- making changes to the file which may cause errors for other agencies in accounts payable.

Other purchasing applications which may readily be adapted to a common system if a common chart of accounts is agreed upon would include the following:

- Encumbering budget accounts for purchase orders issued
- Reporting and aging outstanding purchase orders
- Interfacing with stores for purchasing needs.

If the common vendor file were not used, many applications would be eliminated from a common system, such as:

- Automatically writing the purchase order from the request
- Automatically selecting the most appropriate vendor based on a cumulative scoring system
- Interfacing with accounts payable to produce a vendor warrant.

Areas which may cause problems in a common system include the following:

- Controls over blanket purchase orders
- Use of "instant cash" – a revolving fund purchase order draft used in three of the agencies.

ACCOUNTS PAYABLE

By the time a purchase order is due to be paid, it has been recorded, funds encumbered, receiving copies processed, matched, any exceptions reported, and, in general, thoroughly analyzed by the purchasing system. All that remains to be done is the writing of the warrant. The payment is made ready, triggered and balanced, producing the usual array of warrants, registers, remittance advices, and reconciliation records. The expense data is transmitted to the accounting system.

A common check writing routine would be possible if the agencies have the following:

- A common vendor file *or* input vendor information manually
- A common chart of accounts
- A common outstanding purchase order file.

Some differences which would have to be accommodated include:

- Preparation and accounting for student financial aid checks (Los Rios)
- The "instant cash" (purchase order draft) disbursements
- Expense reimbursement for car allowances, ROP students, mileage, etc.

In general, this system is dependent on information from other systems to provide the features currently enjoyed by the agencies. Unless the interfacing systems are also common, this system would be downgraded as a common system.

STORES

Although the agencies may stock some of the same items, each agency prices its items differently (with or without sales tax and with or without an overhead charge for warehousing) and each agency may use a different reorder point on a given item due to varying rates of usage. Therefore, although a common file for stores items is possible, each agency's stores items would have to be identified separately to enable:

- Preparation of separate catalogs
- Preparation of separate stores inventories
- Different pricing policies
- Different reorder points.

This separate identification would be possible by simply coding the agency into the stock number; however, it is apparent that little savings in file space will occur by combining the present files into a common, separately identified file.

Savings in the long run may occur by developing a common stores accounting system, but none of the present systems could be used "as is." A new application would have to be designed and developed to provide capabilities similar to those in the stores systems currently being used. The Sacramento City stores system would seem to be the best system to use as a base because of its additional capability to interface with the cafeteria program and provide useful management information for surplus commodity purchases.

To provide capabilities similar to those in the stores systems currently being used, the common application would have to:

- Accommodate emergency issue requests.
- Include a back order control system acceptable to all agencies since different methods and procedures are used currently. A poorly designed back order control system will result in duplication of orders and confusion.
- Accommodate possible differences in pick lists due to different warehouse arrangements or methods of filling orders.
- Interface with the accounting system to
  - verify a budget balance sufficient to pay for the stores order,
  - reject the order or print an exception for an overdrawn balance, and
  - charge the order to the proper program, department or school.

This interface takes place through the accounting codes or chart of accounts, and currently these codes are very dissimilar. Although it would be possible to design an application to accommodate the different codes, it would complicate the system to the extent that many of the economies gained by consolidation would be lost. Therefore, a common chart of accounts is the essential first step to consolidation.

Various input formats may be used with a common stores application (mark sense cards, request forms, transmittals) so long as the data on the forms is similar. A common stock numbering system would be desirable.

STUDENT RECORD SYSTEM

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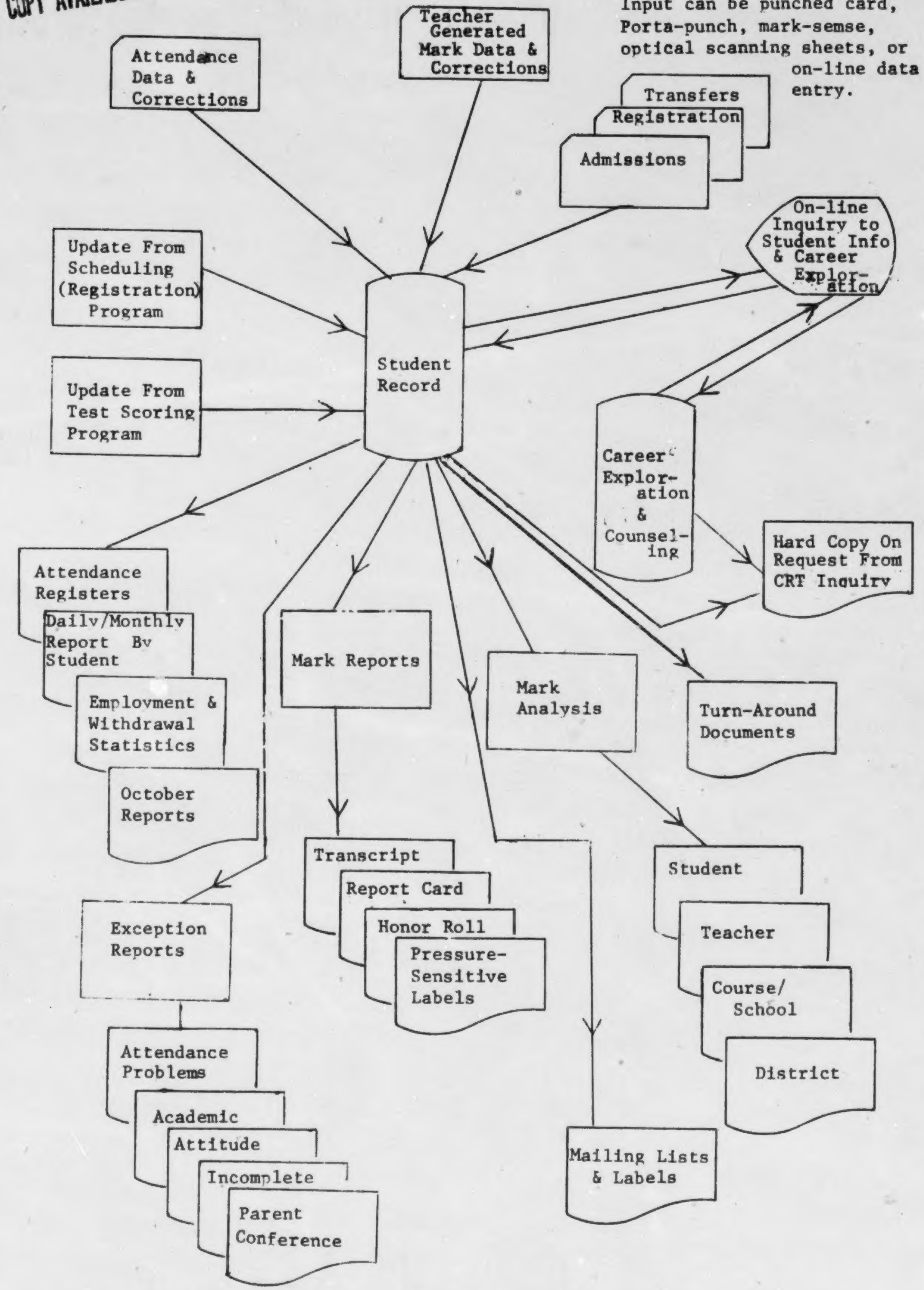

Input can be punched card, Porta-punch, mark-semse, optical scanning sheets, or on-line data entry.

Attendance Data & Corrections
Teacher Generated Mark Data & Corrections
Transfers
Registration
Admissions
On-line Inquiry to Student Info & Career Exploration
Update From Scheduling (Registration) Program
Update From Test Scoring Program
Student Record
Career Exploration & Counseling
Hard Copy On Request From CRT Inquiry
Attendance Registers
Daily/Monthly Report By Student
Employment & Withdrawal Statistics
October Reports
Mark Reports
Mark Analysis
Turn-Around Documents
Transcript
Report Card
Honor Roll
Pressure-Sensitive Labels
Student
Teacher
Course/ School
District
Exception Reports
Attendance Problems
Academic
Attitude
Incomplete
Parent Conference
Mailing Lists & Labels

STUDENT RECORD SYSTEM

The student record systems presently being used by the agencies are quite different from each other (see matrix on next page) and none of those systems would meet the needs of the other agencies in their present form. Since all of the agencies expressed a need to revise their present record system as well as all having long-range goals of developing data based student record systems, we built a general system around an integrated student record system.

This system can be used as the base for a common system if the agencies can agree on the data elements and common student identification number structure. It can also be used as a separate system for each agency. The system may be used in whole or may be divided into subsystems and used modularly.

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CUMULATIVE RECORD/TRANSCRIPT SYSTEM COMPARISON MATRIX

	GRANT JOINT UNION HIGH SCHOOL DISTRICT	LOS RIOS COMMUNITY COLLEGE DISTRICT	SACRAMENTO CITY UNIFIED SCHOOL DISTRICT	SACRAMENTO COUNTY REGIONAL CENTER	SAN JUAN UNIFIED SCHOOL DISTRICT
GENERAL DESCRIPTION	Data Processing is not used in the student records process	Comprehensive automated system which interfaces with grading and registration systems	Comprehensive automated system (format still being revised) which interfaces with grading, scheduling and attendance systems	Based on the Cal-Guidance record, a comprehensive automated system which interfaces with grading, scheduling, testing, and attendance systems	Record is maintained in a guidance folder by hand and computer generated pressure sensitive labels
CONTAINS STANDARDIZED TEST SCORES		Standardized testing is not used in the community colleges	A separate cumulative test record is maintained. Eventually it will be merged with cumulative record	Standardized test scores are an integral part of the cumulative record	Standardized test scores are added to record by hand transferring pressure sensitive labels
METHODS OF UPDATING		Record is updated in the computer memory files – then a totally new record is printed	Record is updated in the computer memory files – then a totally new record is printed	Record is updated in the computer memory files – then a totally new record is printed	A new pressure sensitive label is generated and transferred to the record by hand
CONTAINS GRADE POINT AVERAGE		Grade point average is calculated by semester and cumulative to date	Grade point average is calculated by semester and cumulative to date	Grade point average is calculated by semester and cumulative to date	Computer generated grade point average is not yet an integral part of the record. Hand generated at schools
CONTAINS ATTENDANCE INFORMATION		No – Daily attendance figures are not significant at the community college level	At year-end the attendance summary is added to the record	At year-end the attendance summary is added to the record	No
SIZE OF STUDENT I.D. NO.		9 – digits Based on social security number	9 – digits	10 – digits First digit is alpha	8 – digits
MICRO FILM SYSTEM FOR HISTORY	No	No	Yes – A highly sophisticated Prototype system	Being implemented at selected schools	No

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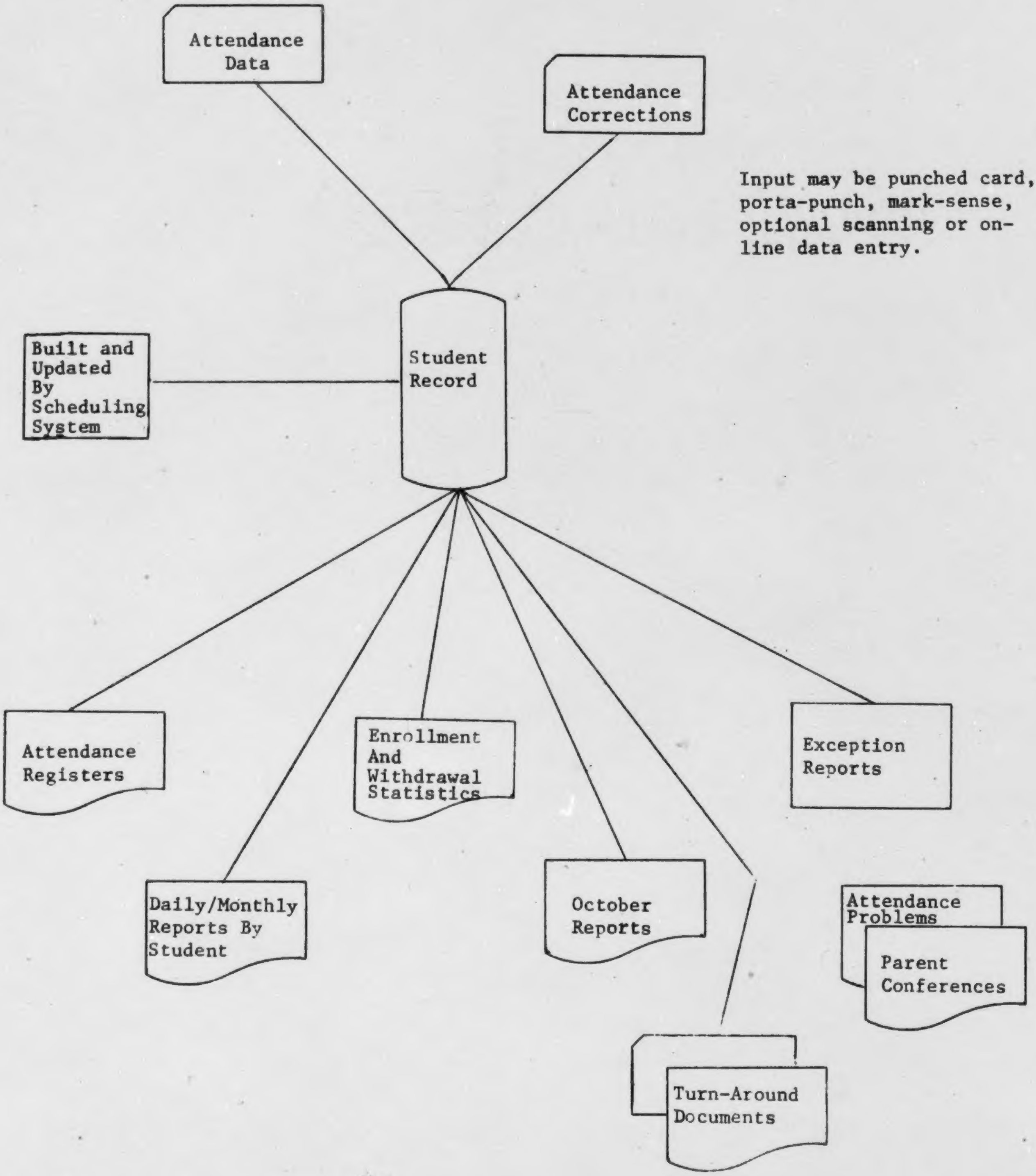
ATTENDANCE SYSTEM


Attendance Data
Attendance Corrections
Built and Updated By Scheduling System
Student Record
Attendance Registers
Daily/Monthly Reports By Student
Enrollment And Withdrawal Statistics
October Reports
Turn-Around Documents
Exception Reports
Attendance Problems
Parent Conferences

Input may be punched card, porta-punch, mark-sense, optional scanning or on-line data entry.

Attendance System

The attendance systems presently being used are so different as to be incompatible. All the present systems are in need of being completely reworked (except for Los Rios, where daily attendance is not as significant as in elementary/secondary districts). Keeping in mind the desire of the agencies to develop integrated data bases, the general systems design for an attendance system is a subsystem of the comprehensive student record system. The types of reports generated by attendance systems are quite basic and similar, as agencies use the same forms for reporting attendance statistics to the State. Therefore, if the agencies were willing, attendance would be one of those applications that could lend itself to a common system. (Note: The number of periods or modules in a school day can be a significant factor in attendance reporting. The differences in scheduling are common throughout the agencies, so those variations can also be shared.)

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ATTENDANCE SYSTEM COMPARISON MATRIX

	GRANT JOINT UNION HIGH SCHOOL DISTRICT	LOS RIOS COMMUNITY COLLEGE DISTRICT	SACRAMENTO CITY UNIFIED SCHOOL DISTRICT	SACRAMENTO COUNTY REGIONAL CENTER	SAN JUAN UNIFIED SCHOOL DISTRICT
GENERAL DESCRIPTION	Does not use data processing in the preparation of attendance reports	Prepare October reports yearly and census day reports once each semester. Daily attendance is not relevant at the community college level	Maintain monthly attendance system, October reporting and student census system. Monthly reports go to schools and include a daily attendance breakdown by student. All special notes for unusual amount of absences	Reports for the state's October reporting requirements are available as well as a monthly/daily attendance reporting system. Each school receives a monthly report with a daily attendance breakdown on each student	Monthly and quarterly attendance reports are generated for the District office. October reports are manually generated from this information
PLANS FOR FUTURE DEVELOPMENT	Would like an attendance system as a part of an integrated pupil personnel package	There is no need for further attendance information	Attendance and census system are written in autocoder, so must eventually be redone. Census is in process of being reworked. Plans for eventual expansion on experimental on-line system at Kennedy High School	Plan to completely rewrite the entire attendance system. Would like integrated data base approach. Would like to be able to provide on-line attendance like Kennedy High School	Present system is written in autocoder and must be reworked. Schools want an attendance system and presently get no service in this area.
INTERFACE WITH STUDENT RECORD	▨	▨	Attendance data is automatically posted to the student record for permanent history at the end of each school year.	Each student record contains the attendance summary for that student. It is posted at year end.	There is no real automated student record system.
INTERFACE WITH MARK REPORTING	▨	▨	Specific attendance information is not posted to report cards, but a comment about attendance problems is an option.	Each report card can contain information about each student's attendance.	A comment on attendance problems is a teacher generated option on report cards
REPORTS TO INDIVIDUAL SCHOOLS	▨	Copies of each report are sent to the individual campuses	School administrators receive monthly/daily attendance reports	School administrators receive monthly/daily attendance reports	School administrators get no feedback on attendance information sent to District office

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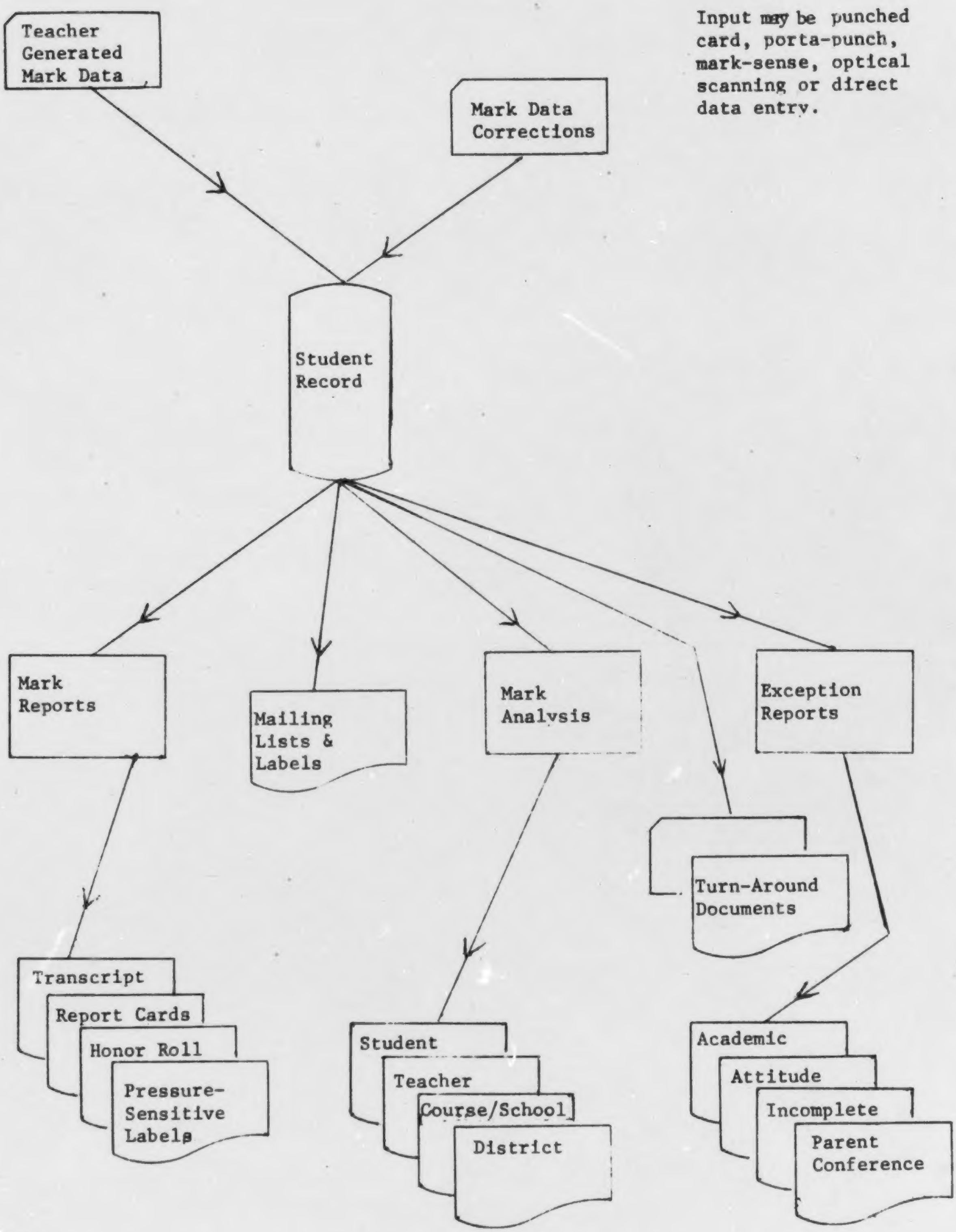
GRADE REPORTING


Teacher Generated Mark Data
Mark Data Corrections
Student Record
Mark Reports
Mailing Lists & Labels
Mark Analysis
Exception Reports
Turn-Around Documents
Transcript
Report Cards
Honor Roll
Pressure-Sensitive Labels
Student
Teacher
Course/School
District
Academic
Attitude
Incomplete
Parent Conference

Input may be punched card, porta-punch, mark-sense, optical scanning or direct data entry.

Grade Reporting System

The variations on grade reporting systems between the agencies are great. While the idea is simple and straightforward – receive a grade from the teacher, post it to student record, report card, and compile statistics for grade point analysis, honor rolls, and agency research projects – there are some major problems. The main problem is how each agency assigns credit for each course. Additional problems are such things as does the agency use pluses and minuses in grading? If pluses and minuses are used, how are they reflected in grade point average?

This does not preclude the use of common systems for mark reporting. It is a matter of the agencies agreeing on commonalities. A modular system could be built that could service many variations; this was proven by the County's Regional Center.

GRADE REPORTING SYSTEM COMPARISON MATRIX

	GRANT JOINT UNION HIGH SCHOOL DISTRICT	LOS RIOS COMMUNITY COLLEGE DISTRICT	SACRAMENTO CITY UNIFIED SCHOOL DISTRICT	SACRAMENTO COUNTY REGIONAL CENTER	SAN JUAN UNIFIED SCHOOL DISTRICT
GENERAL DESCRIPTION	Senior High Schools have unit record equipment with which they produce report cards. Junior High Schools have no automated assistance	Grades are collected on optical scanning sheets and processed at District Data Processing facility	Grades are collected on porta-punch cards and processing at District Data Processing facility	Grades are collected on optical scanning sheets and processing at Regional Center Major redesign planned for this year	Grades are collected mark sense cards, converted on unit record equipment, then processed on District computer
UPDATES CUMULATIVE RECORD	Unit record equipment produces a pressure sensitive label for Senior High School cumulative records.	Semester grades update the cumulative record within computer files. A new transcript is then printed.	Semester grades update the cumulative record within the computer files. A new cumulative record is then printed.	Semester grades update the cumulative (Cal-Guidance) record within computer files. A new cumulative record is then printed	Semester grades are printed on pressure sensitive labels which which are transferred by hand to cumulative record folders
ATTENDANCE INFORMATION ON GRADE REPORT	No automated attendance information is kept or transferred to grade cards.	Daily attendance is not maintained for grade card reporting	No application to report present year attendance information of grade cards presently exists in the District. Prior year attendance is shown on semester end report card.	Daily attendance summaries can be printed on report cards	No specific attendance information is reported. A comment about unsatisfactory attendance is available.
FREQUENCY	Four times per year. Once at each mid-term and once at each semester end.	Grade card is sent to student at mid-term. Updated cumulative record is sent to student at semester end.	Four times per year. Pressure sensitive labels are sent at mid-term. New print-outs of the cumulative record are sent at semester end.	Four to six times per year. Generally printed via pressure sensitive labels	Grade cards are printed four times per year
PLUS/MINUS CAPABILITY	No	No	No	Yes	Yes
G.P.A.	Unit record equipment has no calculation capability. - No	G.P.A. is an integral part of the cum. record sent at semester end	G.P.A. is a part of the grade reporting system	G.P.A. is an integral part of the grade reporting system	Not available yet
GRADES SERVED	Senior High School	Available for all grades served	7-12	7-12	7-12
HONOR ROLL	No	Yes	Yes	Yes	Yes
COMMENTS AVAILABLE	–	No	Yes 18 choices	Yes 9 selections prints 3	Yes 3 choices

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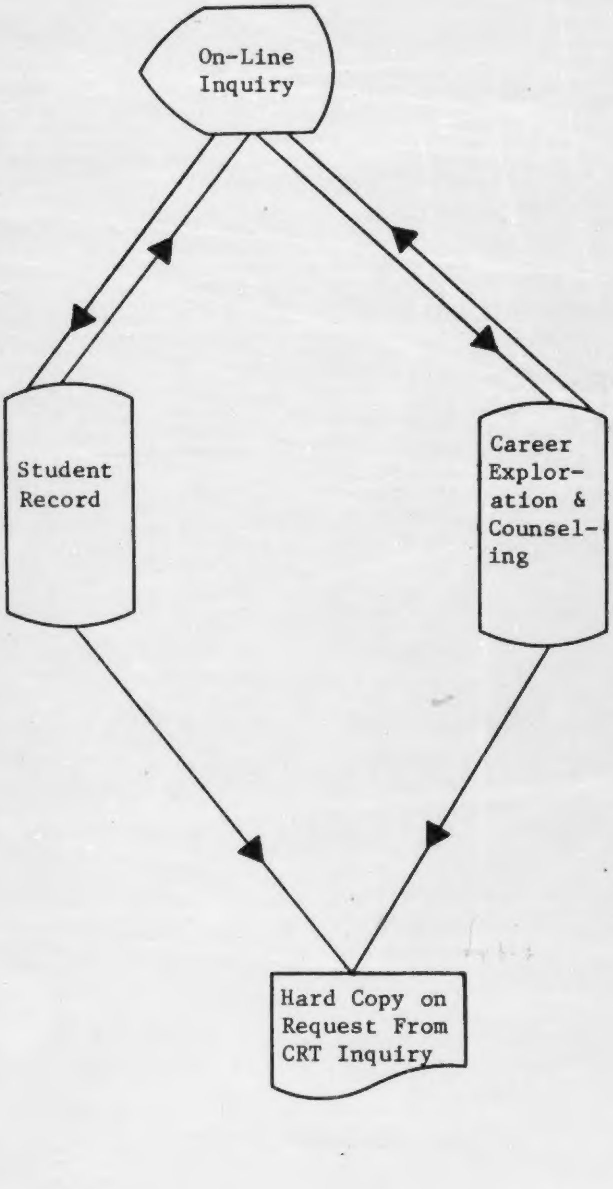
ON-LINE GUIDANCE & CAREER EXPLORATION SYSTEM


On-Line Inquiry
Student Record
Career Exploration & Counseling
Hard Copy on Request From CRT Inquiry

On-line Guidance and Career Exploration System

Los Rios, Sacramento City Unified, Sacramento County, and San Juan Unified School Districts all expressed long-range goals of implementing on-line guidance (counseling) and career exploration systems. What this means is having a terminal (generally a cathode ray tube, CRT) with which both students and counselors can explore student records (a student may only explore his own record). Additionally, the system contains data bases on colleges, jobs, and general career orientation information that can be accessed via the CRT.

A student might want to, for example, receive a list of all the four-year colleges in a particular portion of the country that offer a specific degree program and which have a particular religious affiliation. Or, a student might want to find out what the job market for air conditioning repairmen is in his city, what the requirements are and how one is admitted to an apprenticeship program.

Generally, there is a printer located near the CRT's to allow the student to receive a printed copy of the information he needs once he has found it.

Since none of the agencies have systems in this area, it is an ideal common application.

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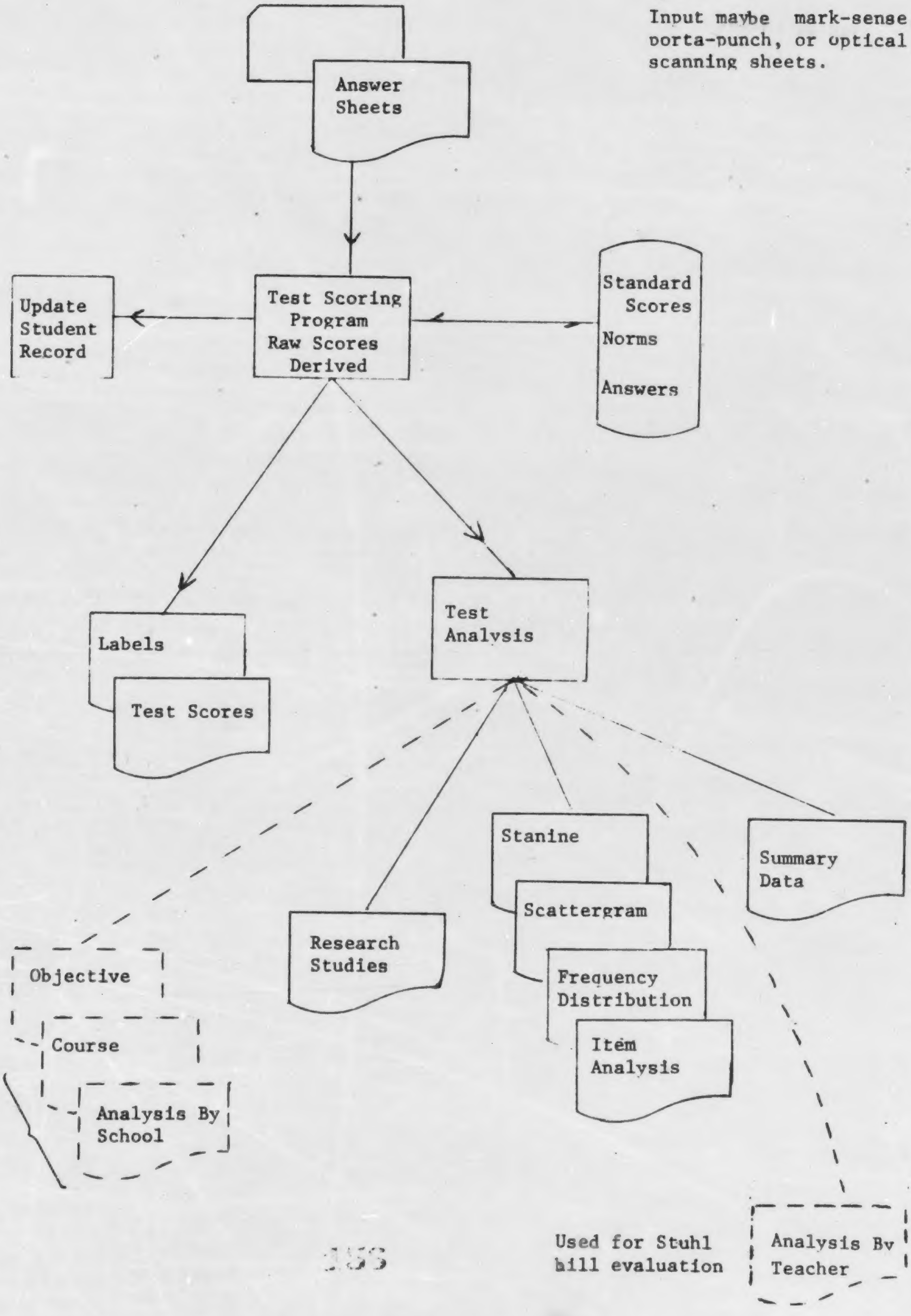
TEST SCORING - STANDARDIZED


Answer Sheets
Test Scoring Program Raw Scores Derived
Update Student Record
Standard Scores
Norms
Answers
Labels
Test Scores
Test Analysis
Objective
Course
Analysis By School
Research Studies
Stanine
Scattergram
Frequency Distribution
Item Analysis
Summary Data
Analysis By Teacher

Input maybe mark-sense,
porta-punch, or optical
scanning sheets.

Future
Tie-in
With PPBS

Used for Stuhl
hill evaluation

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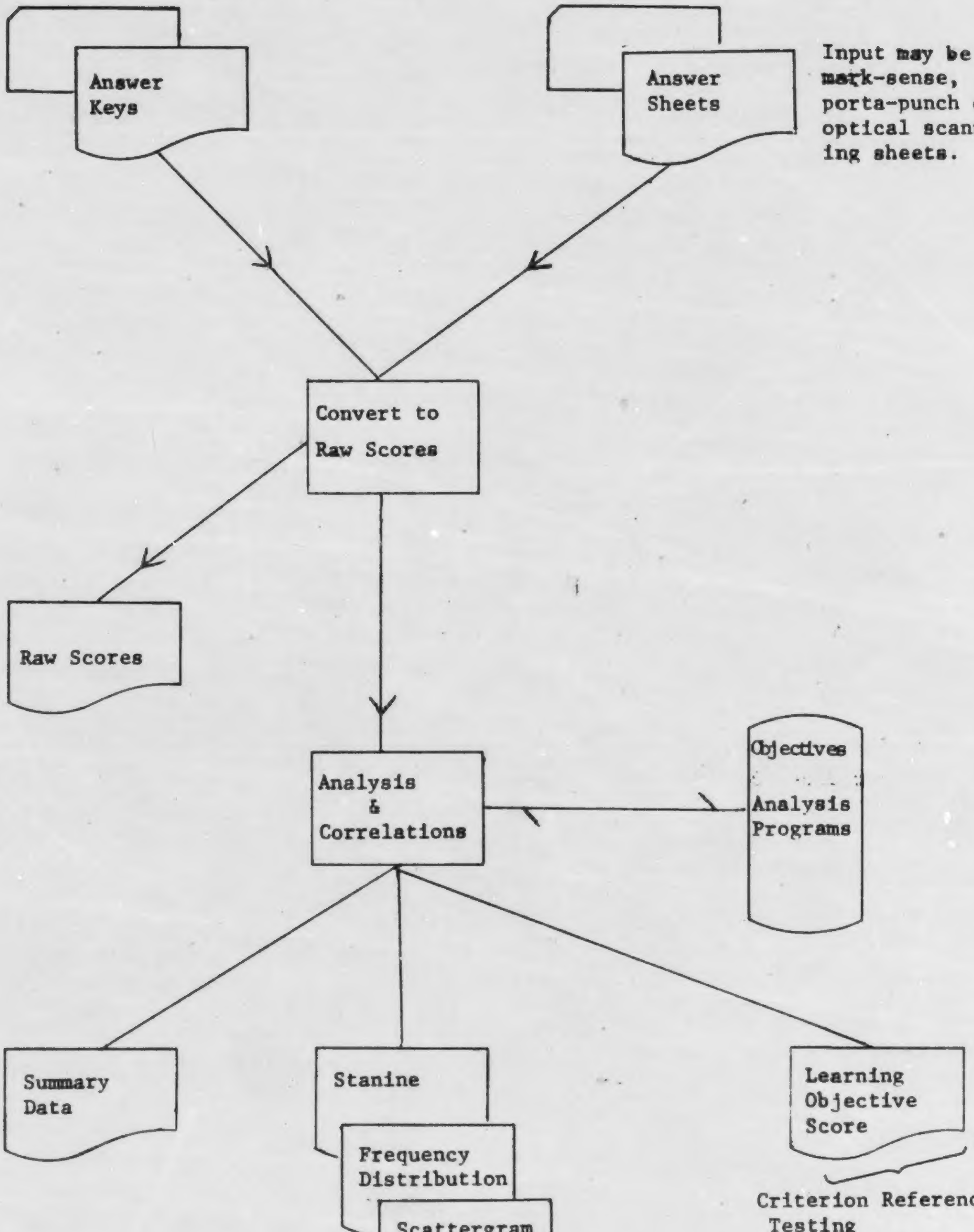
TEST SCORING - TEACHERMADE


Answer Keys
Answer Sheets
Convert to Raw Scores
Raw Scores
Analysis & Correlations
Objectives
Analysis Programs
Summary Data
Stanine
Frequency Distribution
Scattergram
Item Analysis
Learning Objective Score

Input may be mark-sense, porta-punch or optical scanning sheets.

Criterion Reference Testing
This is the first step to invidiualizing instruction through diagnosis and prescription.

TEST SCORING

Test scoring is a basic application that is generally vendor-supplied and tied to specific hardware. The process of scoring the tests, producing item analysis, standard scores, frequency distributions, scatter grams, stanines, and assorted summaries is standard and could easily lend itself to a common system. The complication can arise in trying to correlate criterion reference tests with agency objectives and developing a prescription/diagnosis type system.

The most important aspect of scoring is turnaround time. This could be accomplished in a consolidation by providing high speed up-to-date optical scanning equipment that runs off-line, is staffed around the clock, and guarantees 24-hour turnaround. It might be necessary to lease extra machines for one month twice a year during the peak load fall and spring testing.

Individual agencies may have unique research requirements to tie in with the test analysis. These could be modularly added. Testing is an application area where all the agencies can grow together.

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TEST SCORING SYSTEM COMPARISON MATRIX

	GRANT JOINT UNION HIGH SCHOOL DISTRICT	LOS RIOS COMMUNITY COLLEGE DISTRICT	SACRAMENTO CITY UNIFIED SCHOOL DISTRICT	SACRAMENTO COUNTY REGIONAL CENTER	SAN JUAN UNIFIED SCHOOL DISTRICT
GENERAL DESCRIPTION	Answers, on mark sense cards, are sent to District Data Processing Center for processing	Answers, on scanner sheets, are sent to District Data Processing Center for scoring	Answers, on scanner sheets and mark sense cards are processed on the District Computer under 1401 emulation	Answers on optical scanning sheets are scored at the Regional Center	New computer not fully operational. Therefore cannot access this program which must be converted or replaced
STANDARDIZED TESTING	Scored via mark sense cards	No standardized testing in the community colleges	Scored via scanner sheets and converted to standard scores	Scored via scanner sheets and converted to standard scores	Scored via scanner sheets
TEACHER-MADE TESTING	Available via mark sense cards Item analysis available	Available via optical scanning sheets Item analysis available	Scored via mark sense cards Item analysis available	Scored via scanner sheets. Item analysis Item analysis available	Have not accessed capability on new computer
CRITERION REFERENCE TESTING	Not available A stated District goal	Not available A stated District goal	Not available A stated District goal	Scored via scanner sheets. Interfacing this with a diagnostic / perscriptive system is a County goal	Not available
UPDATES CUMULATIVE RECORD	Prints label for cumulative record	Teacher-made tests are not recorded on cumulative record	Updates a separate cumulative test record on computer files	Updates cumulative record in computer files. Pressure sensitive labels available	Prints pressure sensitive labels
USER COMMENT ON TURN-AROUND TIME	Too slow	Too slow	Too slow	Too slow	Too slow
MARK SENSE/ OPTICAL MARK READ INPUT	IBM 514	IBM 1230	IBM 2501 IBM 1230	Op Scan 100	IBM 1230

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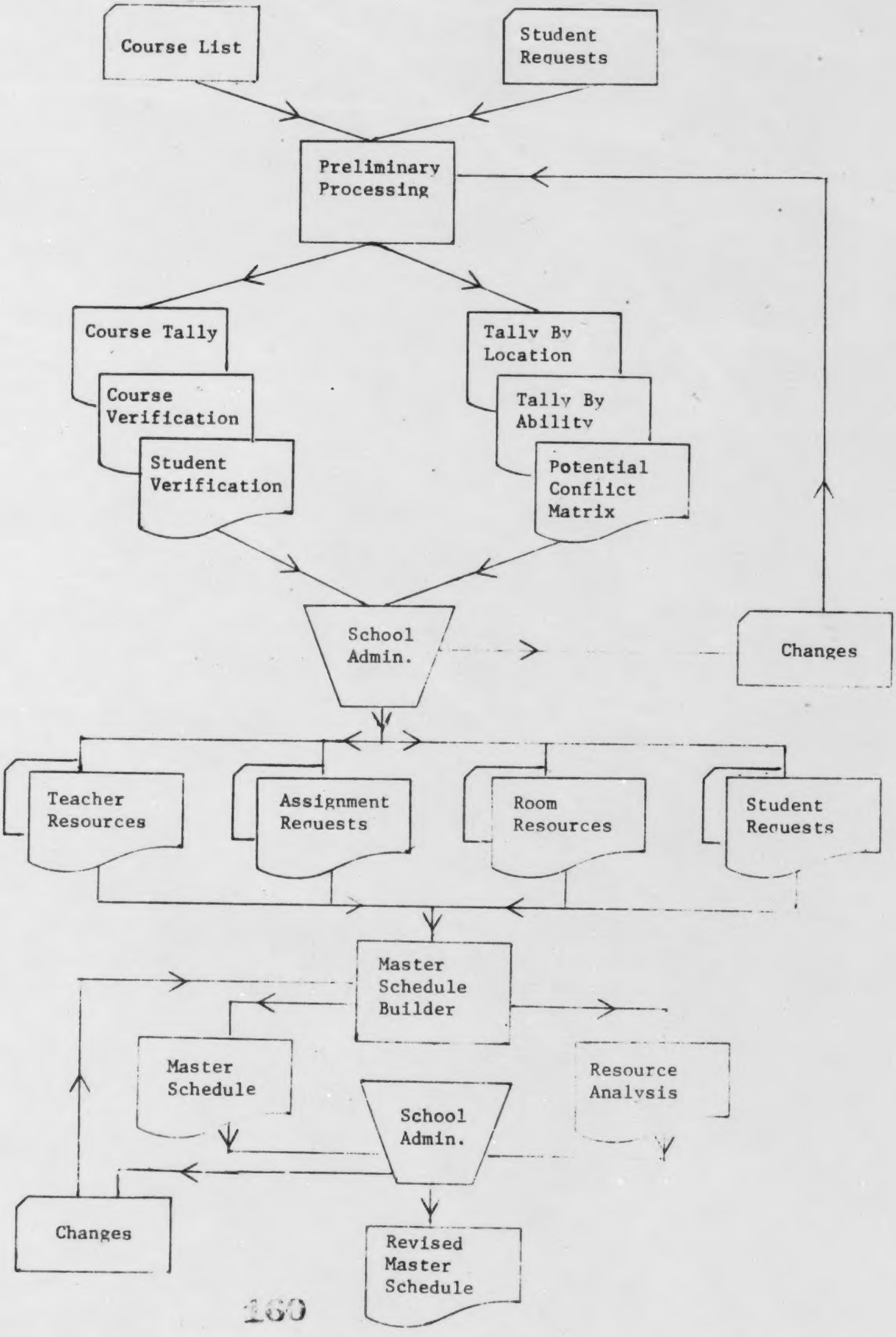
Course List
Student Requests
Preliminary Processing
Course Tally
Course Verification
Student Verification
Tally By Location
Tally By Ability
Potential Conflict Matrix
School Admin.
Changes
Teacher Resources
Assignment Requests
Room Resources
Student Requests
Master Schedule Builder
Master Schedule
Resource Analysis
School Admin.
Changes
Revised Master Schedule

SCHEDULING - STUDENT ASSIGNMENT

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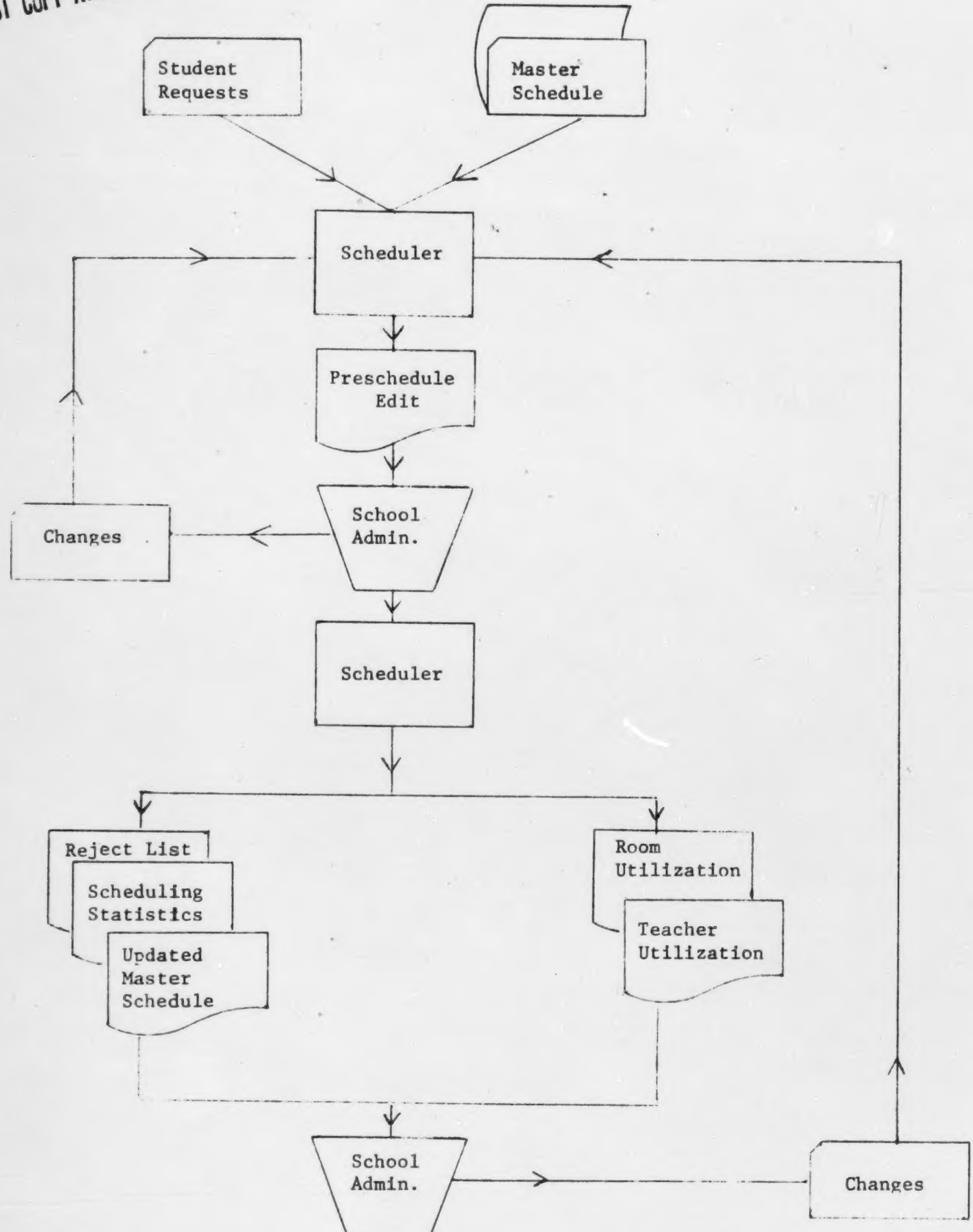
Student Requests
Master Schedule
Scheduler
Preschedule Edit
School Admin.
Changes
Scheduler
Reject List
Scheduling Statistics
Updated Master Schedule
Room Utilization
Teacher Utilization
School Admin.
Changes
A

SCHEDULING - STUDENT ASSIGNMENT (Continued)

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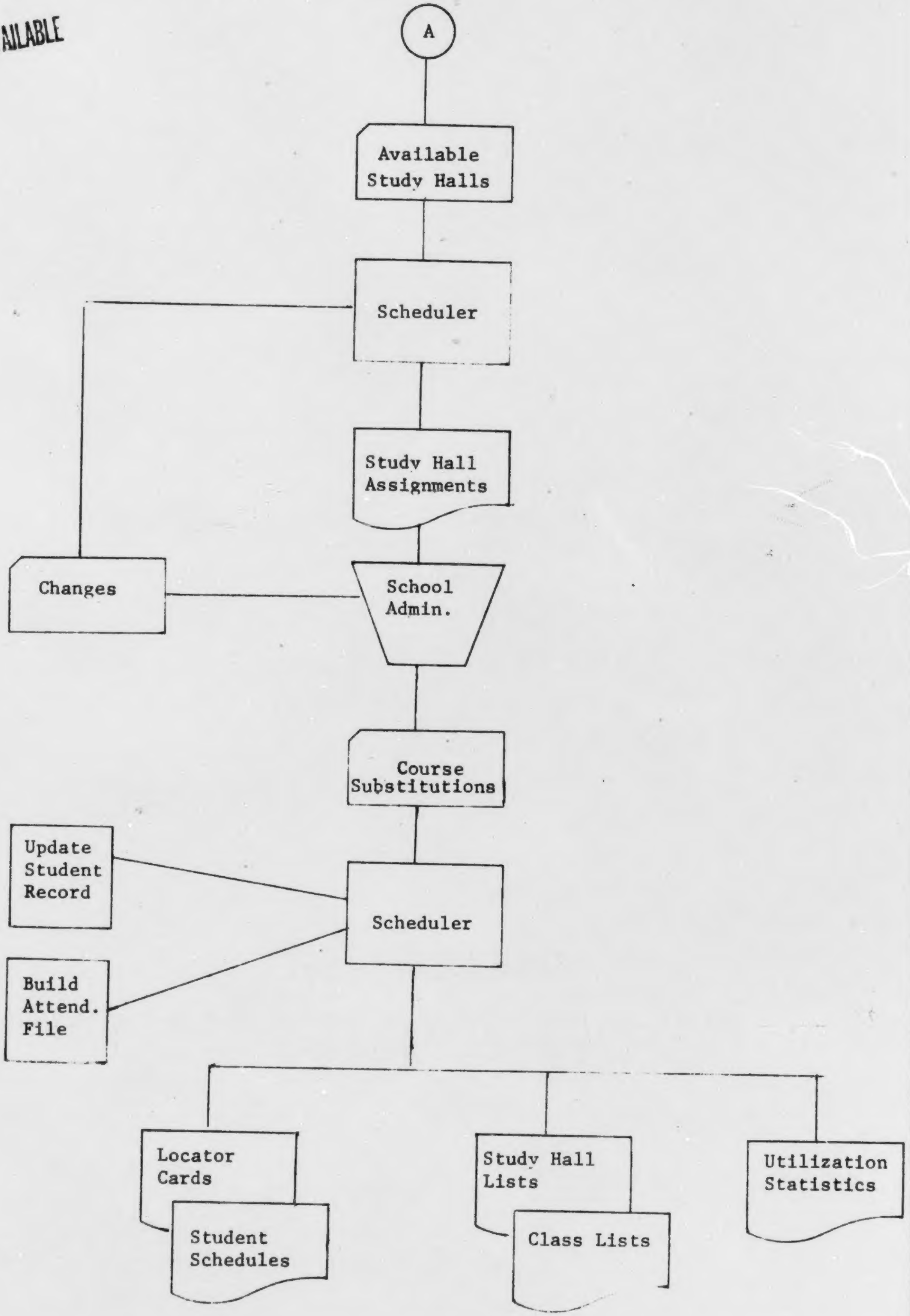
A
Available Study Halls
Scheduler
Study Hall Assignments
Changes
School Admin.
Course Substitutions
Update Student Record
Build Attend. File
Scheduler
Locator Cards
Student Schedules
Study Hall Lists
Class Lists
Utilization Statistics

SCHEDULING/REGISTRATION

Scheduling is undoubtedly the most complex application in schools data processing. The programs are almost always vendor-supplied or commercially procured. Those agencies currently using scheduling programs have different vendors and therefore different (and incompatible) scheduling systems. Those agencies using scheduling programs have expressed a need for a program to build a master schedule.

We have provided a general system design for a master schedule builder and a student scheduler that could serve as the basis for a common system under a consolidated data processing center. The actual program to be used will have to await hardware and vendor selection.

Registration is a process that is performed manually. The computer is basically used as a unit record machine or printing press to confirm what has already been accomplished. Therefore, there is no systems design provided. All of the agencies using registration expressed a plan to eventually implement an on-line registration system. This application is similar to an airline reservation system. The most cost-effective manner of implementing this application is to obtain a vendor package, or one already developed by another educational institution.

As each school must be run separately under any scheduling program, this program has no effect on common applications versus separate applications.

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SCHEDULING/REGISTRATION SYSTEM COMPARISON MATRIX

	GRANT JOINT UNION HIGH SCHOOL DISTRICT	LOS RIOS COMMUNITY COLLEGE DISTRICT	SACRAMENTO CITY UNIFIED SCHOOL DISTRICT	SACRAMENTO COUNTY REGIONAL CENTER	SAN JUAN UNIFIED SCHOOL DISTRICT
GENERAL DESCRIPTION	No computer is used in scheduling process. Hand scheduling at each school	Only registration Students walk thru arena collecting class cards which are later processed in a batch mode	Some schools register (ala Los Rios), others are scheduled completely by the computer	Some schools register (ala Los Rios), others are scheduled completely by the computer	Some schools register (ala Los Rios), others are scheduled completely by the computer
UPDATE TO STUDENT RECORD		There is a tie to student record to maintain a history of classes	File is updated weekly as a result of any schedule changes	Student record reflects the class schedule of the student	No automated updating of the student record
MAJOR CHANGES PLANNED	No change planned Automated scheduling is not a District priority	Long range plans include on-line registration	Long range plans include on-line registration and a master schedule builder	Long range plans include modular scheduling and master schedule builder	District in midst of changing computer A new scheduling package will come with new computer
OTHER SYSTEMS INTERFACED WITH		Student Record Grade Reporting Attendance	Student Record Grade Reporting Attendance	Student Record Grade Reporting Attendance	Grade Reporting
HANDLES ADMISSIONS		Yes	No	Yes	No
PERIODS (MODULES)/DAY		Time is not broken into fixed periods or modules	99	32	26 using alpha characters
RACIAL BALANCING		No automated capability	No automated capability	No automated capability	No automated capability
ABILITY GROUPING		No automated capability	No automated capability	No automated capability	No automated capability

Commonality Ratings

One of the critical elements in this study has been the potential for common systems. In regard to the major discussion of those potentials in this appendix, we have rated the potential for commonality on a scale of A to C. A represents those systems which most readily lend themselves to commonality. C represents those systems which will require the most effort before they can achieve a useful common base.

A-	Financial System
A	Student enrollment projections
A	Income projection
A	Housing (facilities) and capital outlay
C	Operating expense projections
B+	Budget tabulation
C	Cost accounting appropriation balances
C	Personnel System
B	Authorization System
C	Payroll System
B	Purchasing System
B+	Accounts Payable System
B-	Stores System
A-	Student Records System
A	Attendance
B	Grade reporting
A	On-line guidance and career exploration
A	Test Scoring System
A-	Scheduling/Registration System

EXISTING SYSTEMS

The following are the run times, equipment and file requirements for the major systems discussed in this section, as they are presently used.

Budgetary

Grant Joint Union High School District

- Budget System
  - Run monthly
  - Average run time: 3 hours
  - Equipment required:
    - 4K CPU
  - Files used:
    - Budget Master (card)
    - Budget Balance Forward (card)
    - Transaction (card)

Los Rios Community College District

- General Ledger
  - Run monthly
  - Average run time: 35 minutes
  - Equipment required:
    - 50K CPU
    - 2 tape drives
  - Files used:
    - Budget Master (tape)

- Tabulation of Tentative, Published, Final Budgets
  - Run on request while new budget is being prepared (average 12 times per year)
  - Average run time: 20 minutes
  - Equipment required:
    - 65K CPU
    - 1 disk drive (7 million bytes)
    - 4 tape drives
  - Files used:
    - Budget Master (tape)

Sacramento City Unified School District

- Monthly Financial Reports
  - Run monthly
  - Average run time: 3 hours

- Equipment required:
  - 65K CPU
  - 2 disk drives (244 tracks)
  - 3 tape drives
- Files used:
  - Financial Detail (tape)
  - Financial Detail YTD (tape)
  - Financial Summary (tape)
  - Expense Titles (disk)
  - Payroll Titles (disk)
  - School Name (disk)
  - Budget Control (disk)

- Program Budget No. 2
  - Run about 15 times annually (for budget development)
  - Average run time: 2 hours
  - Equipment required:
    - 1401 Emulation – 65K CPU
    - 1 disk drive (200 cylinders)
    - 1 tape drive
  - Files used:
    - Department Titles

Sacramento County Regional Center

- Accounting System (includes accounts payable)
  - Run weekly and monthly
  - Average run time: weekly run 2 hours, monthly run 6 hours
  - Equipment required:
    - 65K CPU
    - 1 disk drive (9 million bytes)
    - 5 tape drives
  - Files used:
    - General Ledger Master (tape)

San Juan Unified School District

- Monthly Budget Detail and Financial Statement
  - Run monthly and quarterly
  - Run times and equipment requirements are not valid as San Juan is converting to different hardware and rewriting these programs
  - Files used:
    - Budget Summary
    - Budget Detail

- Tabulation of Tentative, Published, Final Budgets
  Run on request March through July (average about 24 times per year)
  Run times and equipment requirements are not valid as San Juan is converting to different hardware and rewriting these programs
  Files used:
    Budget (disk)

Cafeteria

Grant Joint Union High School District

- Cafeteria System
  Run once a month
  Average run time: 4 hours
  Equipment required:
    3K CPU
  Files used:
    Cafe Account Master (card)
    Cafe Account Balance (card)
    Cafe Detail (card)

Los Rios Community College District

- Cafeteria
  Application is presently being designed

Sacramento City Unified School District

- Cafeteria
  Run daily and monthly
  Average run time: ½ hour
  Equipment required:
    1401 emulation – 65K CPU
    1 disk drive (7 million bytes)
    1 card punch
  Files used:
    Cafeteria Income
  This application is being totally redesigned for 360/30

Sacramento County Regional Center

No applications in this area

San Juan Unified School District

- Cafeteria
  Run daily and monthly

Timings and equipment requirements are invalid for San Juan as this application is being rewritten and the equipment has been changed
Files used:
  Cafeteria

Payroll/Personnel

Grant Joint Union High School District

- Payroll
  - Run three times monthly
  - This application is in the midst of being redesigned
  - Files used:
    - Master Employee
    - Deduction
    - Year-to-date
    - Additional Earnings
    - Temporary Adjustment

Los Rios Community College District

- Payroll
  - Run twice monthly
  - Average run time: 3-1/3 hours
  - Equipment required:
    - 41K CPU
    - 1 disk drive (7 million bytes)
    - 4 tape drives
  - Files used:
    - Payroll Master
    - Current Earnings Year-to-date

Sacramento City Unified School District

- Payroll/Personnel
  - Run daily
  - Average run time: 3 hours
  - Equipment required:
    - 65K CPU
    - 2 disk drives (400 cylinders)
    - 4 tape drives
  - Files used:
    - Personnel/Payroll Master (tape)
    - Table of Authorized Positions (tape)
    - Payroll Control Totals (disk)
    - Payroll Register (tape)

        - Payroll Titles (disk)
        - Payroll Cancellation Adjustments (tape)
        - School Name (disk)
        - Per Session Sick Leave (tape)
        - Labor History Detail YTD (tape)
        - Month-to-date and YTD Earnings (tape)

Sacramento County Regional Center

- Payroll
    - Run monthly (for regular cycle and for variable cycle)
    - Average run time: 23 hours per cycle
    - Equipment required:
        - 65K CPU
        - 1 disk drive
        - 5 tape drives
    - Files used:
        - Payroll Master
        - Labor Distribution Master

San Juan Unified School District

- Payroll
    - Run six times per month
    - Timings and equipment requirements are not valid for San Juan as this application is being completely redesigned and new equipment is being installed
    - Files used:
        - Payroll Master

Payables and Purchasing

Grant Joint Union High School District

No applications developed in this area

Los Rios Community College District

- Accounts Payable and Purchasing
    - Run weekly
    - Average run time: 1-5/6 hours
    - Equipment required:
        - 65K CPU
        - 4 disk drives (29 million bytes)
        - 5 tape drives
    - Files used:
        - Budget Detail

- Daily Budget (Daily Account Balances)
  - Run daily
  - Average run time: 20 minutes
  - Equipment required:
    - 65K CPU
    - 4 disk drives (29 million bytes)
    - 3 tape drives
  - Files used:
    - Budget Master
    - Detail Budget
    - Vendor
    - Outstanding Purchase Order

Sacramento City Unified School District

- Duplicating (Accounts Payable)
- Maintenance Expense (Accounts Payable)
- Accounts Payable and Purchasing (Accounts Payable)
- Daily Account Balance (Accounts Payable)
  - Run weekly and monthly
  - Average run time: weekly ¾ hour, monthly ½ hour
  - Equipment required:
    - 65K CPU
    - 3 disk drives (300 cylinders)
    - 3 tape drives
  - Files used:
    - Accounts Payable Warrants (tape)
    - Accounts Payable Purchase Orders (disk)
    - Vendor Name Master (disk)
    - Budget Master (disk)
    - Budget Control (disk)
    - Financial Detail (tape)
    - Accounts Payable Remittance Advice (tape)
    - Expense Titles (disk)

Sacramento County Regional Center

- Accounting System
  - Run weekly and monthly
  - Average run time: weekly 2 hours, monthly 6 hours
  - Equipment required:
    - 65K CPU
    - 1 disk drive (9 million bytes)
    - 5 tape drives
  - Files used:
    - General Ledger Master (tape)

San Juan Unified School District

- Accounts Payable and Purchasing
  - Run three times per month
  - Equipment requirements and run times are not valid for San Juan as these programs are being rewritten and equipment replaced
  - Files used:
    - Purchase Order Vendor
    - Outstanding Purchase Order
    - Budget

- Daily Account Update (Daily Account Balance)
  - Run daily
  - Timings and equipment requirements are invalid for San Juan as these programs are being rewritten and equipment changed
  - Files used:
    - Budget (disk)

- Duplicating
  - Run monthly
  - Timings and equipment requirements are invalid for San Juan as these programs are being rewritten and equipment changed
  - Files used:
    - Card only

Stores

Grant Joint Union High School District

- Storeroom Inventory
  - Run monthly
  - Average run time: 3 hours
  - Equipment required:
    - 4K CPU
  - Files used:
    - Master Description (cards)
    - Balance Forward (cards)
    - Transaction (cards)

Los Rios Community College District

- Stores
  - Run weekly
  - Average run time: 20 minutes

Equipment required:
- 63K CPU
- 1 disk drive (7 million bytes)
- 4 tape drives

Files used:
- Stores
- Budget Master

Sacramento City Unified School District

. Stores

Run weekly and monthly
Average run time: weekly 4 hours, monthly 15 minutes
Equipment required:
- 65K CPU
- 3 disk drives (1350 tracks)
- 3 tape drives
- Card punch

Files used:
- Stores Back Order (tape)
- Stores Master (disk)
- Stores Report (tape)
- Stores Receipt History (tape)
- Budget Master (disk)
- Stores Surplus Commodity (disk)
- Budget Control (disk)
- Stores Balance Control (disk)
- Financial Detail (tape)
- Stores Surplus Offering (disk)

Sacramento County Regional Center

No applications in this area

San Juan Unified School District

. Stores

Run twice weekly
Run times and equipment requirements are not valid for San Juan as the equipment has just been changed and this program is being rewritten
Files used:
- Stores

Student Records

Grant Joint Union High School District

None

Los Rios Community College District

- Transcript Preparation
  - Run 5 times fall and spring; 3 times during summer session
  - Average run time: 3 hours per college
  - Equipment required:
    - 65K CPU
    - 2 disk drives (14.5 million bytes)
    - 4 tape drives
  - Files used:
    - Student Master
    - Permanent Record
    - Grade tape (only a semester end)
- Student-Counselor List and Reports
  - Run 4th week of each semester; 2nd week of summer session
  - Average run time: 2 hours per college
  - Equipment required:
    - 65K CPU
    - 2 disk drives (14.5 million bytes)
    - 2 tape drives
- Evaluation for Graduation
  - Run three times per year (once a semester)
  - Average run time: 1½ hours per college
  - Equipment required:
    - 64K CPU
    - 3 disk drives (22 million bytes)
    - 4 tape drives
  - Files used:
    - Student Master
    - Computer Generated Permanent Record

Sacramento City Unified School District

- Student Census (Student-Counselor Lists and Reports)
  - Run weekly, monthly, semiannually, annually and on demand
  - Average run time: 3 hours
  - Equipment required:
    - 1401 emulation – CPU
    - 1 disk drive (SYS RES)
    - 3 tape drives
    - Card punch
  - Files used:
    - Student Census Master
    - Current Transiency Master
    - Teacher Master and Course Card Work
    - Grid Code Master

- Cumulative Guidance
  - Run twice a year
  - Average run time: 52 hours
  - Equipment required:
    - 50K CPU
    - 1 disk drive (2 cylinders)
    - 4 tape drives
  - Files used:
    - Current census
    - Student History Master
    - School Name
    - Internal Files (R-2, R-4, R-6)

Sacramento County Regional Center

- Transcript Preparation (Cal-Guidance)
  - Run twice a year
  - Average run time: 1¼ hours per 1,000 students (70-80,000 students)
  - Equipment required:
    - 62K CPU
    - 6 tape drives
  - Files used:
    - Cal-Guidance
    - Mark Report
    - Student Master

San Juan Unified School District

- Transcript Preparation (Cum Record)
- Student-Counselor Lists and Reports
  - Detail information is invalid as district has just changed equipment and is in the process of massive conversion
  - Files used:
    - Cum Record History
    - Student Course

Attendance

Grant Joint Union High School District

None

Los Rios Community College District

- Census Day Attendance Reporting
  - Run once per semester/session
  - Average run time: 5 hours

- Hardware requirements (card reader and printer are assumed requirements):
  - 64K CPU
  - 4 tape drives (29 million bytes)
  - 3 disk drives
- Files used:
  - Student Master (tape)
  - Master Schedule (disk)

- October Reporting
  - Run once per semester/session
  - Average run time: 30 minutes
  - Hardware requirements:
    - 40K CPU
    - 3 disk drives (22 million bytes)
    - 2 tape drives
  - Files used:
    - Student Master (tape)
    - Master Schedule (disk)

Sacramento City Unified School District

- Monthly Attendance Reports (Secondary Attendance)
  - Run monthly and annually
  - Average run time: 4 hours monthly, 8 hours annually
  - Hardware required:
    - 1401 emulation –
    - 3 disk (22 million bytes)
  - Files used:
    - Student Census
    - School Name

- October Reporting
  - Drawn from monthly attendance reports
    - Requirements are the same
    - Times not available

Sacramento County Regional Center

- Monthly Attendance Reports
  - Run monthly
  - Average run time: 1 hour/1,500 students (presently serve 70,000)
  - Hardware requirements:
    - 65K CPU
    - 1 disk (9 million bytes)
    - 6 tapes

Files used:
  - Student Master
  - Cal-Guidance

- October Reporting
  - Run annually
  - Average run time: 1 hour/1,500 students
  - Hardware required:
    - 65K CPU
    - 1 disk (9 million bytes)
    - 6 tapes
  - Files used:
    - Student Master
    - Teacher Master

San Juan Unified School District

- Monthly Attendance Reports
  - Run monthly
  - Average run time: ½ hour per school (79 schools)
  - Hardware required:
    - Not valid as San Juan is in the midst of hardware change and program conversion
  - Files used:
    - Student Course File

Grade Reporting

Grant Joint Union High School District

Not a district data processing application

Los Rios Community College District

- Grade Reporting
  - Run five times per year (midterm – fall and spring; semester end – fall, spring and summer)
  - Average run time: 86 hours
  - Equipment required:
    - 65K CPU
    - 3 disk drives (22 million bytes)
    - 4 tape drives
  - Files used:
    - Student Master
    - Master Schedule
    - Grade Tape

- Postsemester GPA Analysis
  - Run three times per year (once each fall, spring and summer)
  - Average run time: 1/3 hour per college
  - Equipment required:
    - 35K CPU
    - 1 tape drive
  - Files used:
    - See Grade Reporting

Sacramento City Unified School District

- Report Cards (Grade Reporting)
  - Run five times per year
  - Average run time: 42 hours
  - Equipment required:
    - 1401 emulation – 65K CPU
    - 2 tape drives
  - Files used:
    - Teacher Master and Course Card
    - Student Census
    - Report Card

Sacramento County Regional Center

- Grade Reporting
  - Run four times per year (6 times for some schools)
  - Average run time: 2 hours/1,000 students
  - Equipment required:
    - 65K CPU
    - 1 disk drive (9 million bytes)
    - 6 tape drives
  - Files used:
    - Student Master
    - Cal-Guidance
    - Teacher Course Master

San Juan Unified School District

- Grade Reporting
  - Run four times per year
  - Average run time: 2 hours per school (79 schools)
  - Equipment estimates as well as timings are invalid as district has just changed equipment and is in the midst of converting these systems
  - Files used:
    - Previously card input only

Test Scoring

Grant Joint Union High School District

- Test Scoring
  - Fall and spring testing run about 35 hours each
  - Teacher made testing is run on request and averages about 10-15 hours per month
  - Equipment required:
    - 4K CPU
    - Card system

Los Rios Community College District

- Test Scoring (Teacher-made)/Surveys
  - Run on request (daily)
  - Average run time: 3-5 minutes
  - Equipment required:
    - 35K CPU
    - Disk work file
  - Files used:
    - None

Sacramento City Unified School District

- Standardized Testing
  - Run twice per year
  - Average run time: 30 hours
  - Equipment required:
    - 57K CPU
    - 1 disk (200 cylinders)
    - 4 tapes
  - Files used:
    - Current Census
    - Frequency Distribution
    - CTBS – Loaded
    - CTBS – Report
    - School Name
    - Student Name
    - Student History
    - Master Test
    - CTBS Sum Total
    - Test – Comped
    - Test – Pro-asp
- Cumulative Test Record (Longitudinal Test History)
  - Run twice per year
  - Average run time: 5 hours

Equipment required:
- 40K CPU
- Disk (12 cylinders)
- 3 tape drives

Files used:
- Student History Master
- Current Census
- School Name
- CAG Testing

. Elementary Teacher Testing Service
  Run as needed
  Average run time: cumulative monthly average – 19 hours
  Equipment required:
    1401 emulation
  Files used:
    None

Sacramento County Regional Center

. Test Scoring
  Run several times per week
  Average run time:
    CTBS (no frequency dist) – 3 hours per 1,000 students
    Single pt. frequency dist – 1 hour per 1,000 students
  Equipment required:
    65K CPU
    2 disk drives (18 million bytes)
    6 tape drives
  Files used:
    Student Master
    Test History
    Cal-Guidance
    Master Answer Key
    Norms and Procedures

. Longitudinal Test History Reporting
  Run annually
  Average run time: 4 hours per 400 students
  Equipment required:
    65K CPU
    1 disk drive (9 million bytes)
    6 tape drives
  Files used:
    Test History
    Student Master

San Juan Unified School District

- Standardized Testing
  - Details not valid as this is a vendor supplied program and district has changed vendors and equipment

Scheduling/Registration – Existing Systems

Grant Joint Union High School District

Not available as a district service

Los Rios Community College District

- Development of Master Schedule
  - Run three times per year
  - Average run time: 38 hours plus 7 hours per week for updates
  - Equipment required:
    - 65K CPU
    - 2 disk drives (100 cylinders)
    - 4 tape drives
  - Files used:
    - Master Schedule (disk)
    - Common Disk File (disk)
    - Student Master (tape)

- Registration
  - Run daily during registration, weekly, monthly and assorted special runs
  - Average run time: 2-1/3 hours
  - Equipment required:
    - 65K CPU
    - 2 disk drives (100 cylinders)
    - 4 tape drives
  - Files used:
    - Same as Development of Master Schedule – see above

- Teacher Load Reporting/Class Size
  - Run daily during registration, 4th, 10th and 14th weeks
  - Average run time: ¾ hour per college
  - Equipment required:
    - 65K CPU
    - 4 disk drives (29 million bytes)
  - Files used:
    - Master Schedule (disk)
    - Common Disk (disk)

- Student Directory (Active List)
  Run twice each semester (1st and 6th weeks)
  Average run time: ¾ hour per college
  Equipment required:
    65K CPU
    3 tape drives
  Files used:
    Student Master
    Fourth Week Report

- Student Profiles
  Run twice per semester
  Average run time: 1 hour per college
  Equipment required:
    65K CPU
    3 disk drives (22 million bytes)
    3 tape drives
  Files used:
    Student Master

Sacramento City Unified School District

- Student Scheduling
  Run regularly on request – about 105 times per year
  Average run time: 2 hours
  Equipment required:
    65K CPU
    3 disk drives (22 million bytes)
    4 tape drives
  Files used:
    Student Course Request Master
    Student Census Master
    Master Schedule
    School Name
    Bin Deck

- Student Locators
  Run 2-4 times per year
  Average run time: 1 hour
  Equipment required:
    1401 emulation – 65K CPU
    1 disk drive (7 million bytes)
    1 tape drive
  Files used:
    Teacher Master and Course Card

- Class Size
  - Run once a year
  - Average run time: 1 hour
  - Equipment required:
    - 1401 emulation – CPU
    - 2 disk drives (14.5 million bytes)
  - Files used:
    - School Name

Sacramento County Regional Center

- Class Scheduling
  - Run annually with several simulation runs (whole routine extends 3-6 months)
  - Average run time: 6 hours per 1,000 students
  - Equipment required:
    - 65K CPU
    - 1 disk (9 million bytes)
    - 6 tape drives
  - Files used:
    - Student Scheduling
    - Student Master
    - Teacher Course Master

San Juan Unified School District

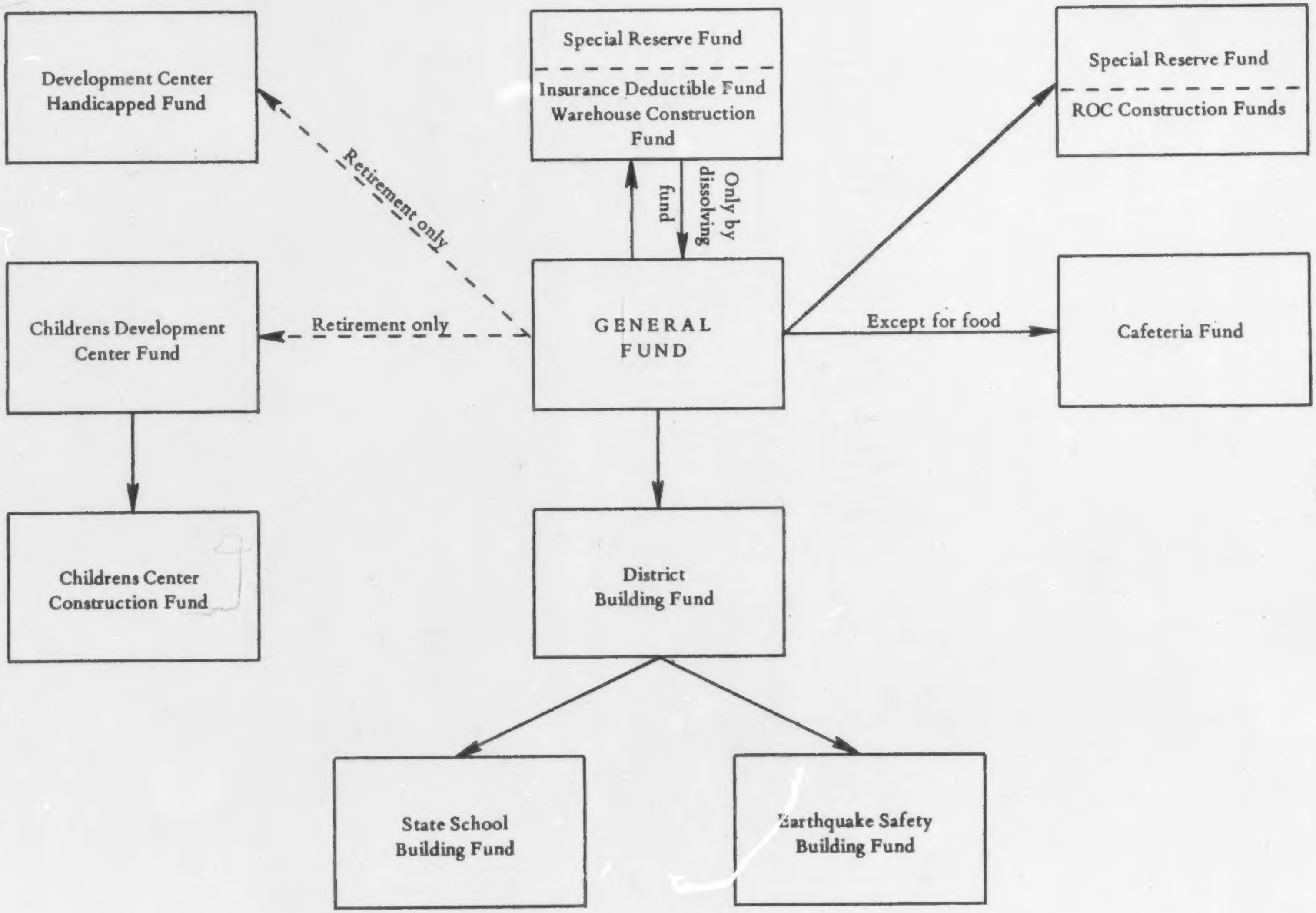
- Class Scheduling
- Teacher Load Reporting/Class Size

  Equipment and timing details are invalid as scheduling is a vendor supplied program and the district has just changed vendors and hardware

APPENDIX C

SPECIAL FUNDS MAINTAINED BY SCHOOL DISTRICTS

INTERRELATIONSHIPS BETWEEN COMMON FUNDS MAINTAINED IN PUBLIC SCHOOL DISTRICTS


Development Center Handicapped Fund
Special Reserve Fund
Insurance Deductible Fund Warehouse Construction Fund
Special Reserve Fund
ROC Construction Funds
Retirement only
Only by dissolving fund
Childrens Development Center Fund
Retirement only
GENERAL FUND
Except for food
Cafeteria Fund
Childrens Center Construction Fund
District Building Fund
State School Building Fund
Earthquake Safety Building Fund

BEST COPY AVAILABLE

SPECIAL FUNDS MAINTAINED BY SCHOOL DISTRICTS

A number of funds are currently available to public school districts for the budgeting and administration of finances. All districts in the State will find it necessary to use the General Fund. It is unlikely that any school district will use all of the special funds, but most districts will use some. Special funds are an important part of the school budget.

Funds other than the General Fund that require budgetary control by the board and superintendent include: (1) the Building Fund; (2) the State School Building Aid Fund; (3) the Special Reserve Fund; (4) the Cafeteria Account or Cafeteria Fund; (5) the Child Development Fund, and (6) the Development Center Fund. In addition to the above funds, community colleges have available several other funds. The Bond Interest and Redemption Fund is administered by the county auditor and is included for information purposes only. Special funds are established by school districts only where the law permits or requires that they be established. The separate identity of monies raised or allocated for special purposes, including year-end balances, must be maintained and used for authorized purposes only.

A given expenditure may be chargeable to several funds. For example, an expenditure for the replacement of equipment or the purchase of supplies (other than food) for a school cafeteria is normally made from the cafeteria account or cafeteria fund. If the fund is insufficient for this purpose, however, the expenditure may be made from the General Fund. Interfund transfers should be carefully analyzed and the results should be used as a basis for budget preparation.

BUILDING FUND

The Education Code provides for the establishment of a Building Fund through deposit in the county treasury of proceeds from the sale of school district bonds (Education Code 21701) or through the transfer of General Fund monies. Community colleges should refer to Education Code, Chapter 19, Community College Construction Act.

Legal Limitations

Resources of the Building Fund may be used only for the purposes stated in the bond indenture at the time that the bonds were voted. Education Code Section 21701 provides that bonds may be voted for the following purposes:

1. Purchasing school lots
2. Building or purchasing school buildings
3. Making alterations or additions to a school building or buildings other than those changes that may be necessary for current maintenance, operation, or repairs

4. Repairing, restoring, or rebuilding any school building damaged, injured or destroyed by fire or other public calamity
5. Supplying school buildings and grounds with furniture, equipment, or necessary apparatus of a permanent nature
6. Making a permanent improvement of school grounds
7. Refunding any outstanding valid indebtedness of the district, evidenced by bonds or state school building aid loans
8. Carrying out the projects or purposes authorized in Education Code Section 15811
9. Purchasing school buses that have a useful life expectancy of at least 20 years
10. Demolishing or razing a school building with the intent of replacing it with another school building in the same place or in another place.

Steps in Budgeting

The following steps should be followed in budgeting for a Building Fund:

Beginning balance. Cash in the County treasury and other assets of the Building Fund, such as cash collections awaiting deposit, investments in U.S. bonds, and accounts receivable, should be included in the beginning balance.

Current liabilities included in the beginning balance should be limited to obligations for services already performed or to materials and equipment already received on or before June 30. No amount of liability should be set up for the uncompleted portion of work being performed by a contractor.

Income. In anticipation of required income from the sale of bonds, study should be made of the building needs of the district. (Education Code Section 21702, et seq. See the following section in this appendix on State School Building Fund.) In this study the following items should be taken into consideration:

1. The amount of bond proceeds from bonds already authorized but not yet issued.
2. The amount of bond sales anticipated from a bond election already scheduled but not yet held.
3. The amount of bond sales anticipated during the forthcoming year from a future bond election that has not yet been scheduled but that will be necessary to meet the building needs of the district.

Amounts to be derived from the sale of personal or real property originally purchased from the Building Fund must be deposited in that fund and therefore may be budgeted as Building Fund revenue (Education Code Section 16403).

Expenditures and transfers. Expenditures and transfers should be budgeted in accordance with the chart of accounts for the Building Fund.

Ending balance. The ending balance should be predicted as accurately as possible to reflect the anticipated progress of the building program during the budget year. Accuracy in budgeting will help eliminate shortages in this fund. An additional precaution against shortages is the inclusion of a ten percent contingency appropriation.

STATE SCHOOL BUILDING FUND

The State School Building Aid Law of 1952, together with later enactments, has made available to qualifying school districts the funds needed to help in the purchasing and developing of school sites and the constructing and equipping of buildings. Education Code Sections 19551 through 19715 provide the legal basis for the apportionment of these funds by the State Allocation Board to the school districts. Districts that qualify for this aid must include in their budgets a State School Building Fund (Education Code Section 19623). The purpose of establishing this fund is to guarantee that all income and expenditures from the fund are properly accounted. The monies deposited to this fund are apportionments from the State School Building Aid Fund, district contributions and Federal grants.

State Apportionments

Apportionments from the State School Building Aid Fund are made by the State Allocation Board. A district's eligibility for these apportionments is established on the basis of qualification.

District Contributions

District contributions include funds raised through the sale of bonds and the transfer of any funds available to the district. These transfers are made as required by the State Allocation Board as a condition of the district's participation in the State School Building Aid Fund.

Federal Grants

Federal funds may be secured under PL 815 by eligible districts. When such funds are received by a district, they may be used to reduce the amount allocated by the State from the State School Building Aid Fund.

Requirements

Any apportionment paid to a school district and deposited in this fund is available for expenditure for not less than one year nor more than three years as the State Allocation Board shall determine. After the period of availability, the unencumbered balance becomes due and payable to the State.

Each district that secures State building aid funds will receive detailed instructions from the Office of Local Assistance and must make detailed reports to the State Controller and the State Allocation Board as required. The governing board must annually have an external audit made of the fund. The State Department of Finance and the Office of Local Assistance also audit the fund to determine whether the money received by the district has been expended for the purposes authorized by the State School Building Aid Law. These audits are conducted on a project basis and emphasize the need for an extensive accounting system and firm budgetary controls of revenue and expenditures.

Repayments to the State on loans made to the district are based on a given number of years and are limited by the assessed valuation of the district and the outstanding bonds owed by the district. The amount due is withheld each year from the district's regular State apportionment and the district is permitted to levy a tax to raise an amount equal to the amount withheld by the State.

SPECIAL RESERVE FUND

Authorization

Education Code Section 21401 authorizes school districts to establish a special fund for capital outlay purposes.

Legal Limitations

Legal limitations are as follows:

1. Funds may be derived from any source.
2. The governing board establishes the fund by resolution, specifying the purpose or purposes of the Special Reserve Fund.
3. The governing board may at any time file resolutions changing the purposes of the fund or withdrawing any purpose previously mentioned.
4. The governing board may at any time upon written request to the Superintendent of Schools, Auditor and Treasurer of the County, have the money transferred back to the General Fund of the district, with the

exception of funds received under Education Code Section 20206 in the case of community colleges.

5. Special Reserve Funds are to be used for capital outlay purposes and may include salaries of school district employees whose work is directly related to such capital outlay projects.

Budgeting

The governing board may appropriate and expend the money in the Special Reserve Fund as it sees fit for the purpose or purposes specified in the resolution establishing the fund.

Restrictions

The only restriction in the use of Special Reserve Funds is that they are to be used for capital outlay purposes. Beyond that, the only restrictions are those imposed in the governing board's resolution establishing the fund.

BOND INTEREST AND REDEMPTION FUND

Authorization

Education Code Section 22101 authorizes the County Board of Supervisors to levy a tax annually within a school district to provide for the interest and redemption of all outstanding bonded indebtedness of the district. Government Code Section 29043 directs the County Auditor to provide the bonded debt service requirements for this levy. The responsibility for the administration of the fund rests with the County Auditor and is therefore of minimal concern to school district administrators.

The discussion that follows is presented to provide a broad understanding of the nature of this fund to the school administrator, without becoming the detailed analysis required to prepare a district budget.

Limitations

This fund is established for the sole purpose of payment of the interest and redemption of all outstanding bonded indebtedness of a district. No other expenditures are authorized within this fund.

Steps in Budgeting

Beginning balance. The beginning balance consists of the following:

1. Accounts receivable

2. Cash on deposit with the County Treasurer as well as cash awaiting deposit should be included
3. Government obligations and any other legal investments of the fund.

Income. The primary source of income to this fund is the local tax levy. However, interest received for the investment of the fund with the County Treasurer, along with other minor items of income, shall accrue to the fund. The amount of income to the fund must be sufficient to:

1. Pay interest on indebtedness as it becomes due.
2. Provide for the payment of indebtedness on or before it becomes due.
3. Provide an annual reserve.

In estimating interest and indebtedness, the amounts that will become due up to the time of the first receipt of proceeds of the next following year's tax levy must be provided. In effect then, at the time that the income requirements for the fund are determined, a period of more than one year should be considered.

The annual reserve may be provided to prevent wide fluctuations in the tax rates to support the fund. This fact is of particular interest to school administrators concerned with the public relations aspect of tax rates.

Expenditures and other outgo. The expenditure budget of this fund mainly reflects the amounts of interest to be paid and principal to be retired during the fiscal year. The time span involved in this portion of the budget is different from that used in estimating income. Therefore, an ending balance is needed because cash is required to pay those obligations arising between July 1 and the next tax receipts. These are generally available in the month of December.

When the paying agent for an issue is other than the County Treasurer, fees charged by this agent are chargeable to this fund.

CAFETERIA FUND OR ACCOUNT

The Education Code provides for establishing the Cafeteria Fund in Education Code Section 17501. The choice of using Cafeteria Fund or Account remains with the district. If a Cafeteria *Fund* is maintained, the money is paid into the *County Treasury*; if a Cafeteria *Account* is maintained, the money is deposited in a *bank or banks*. In either, the following rules pertain:

1. The money may only be used for expenditures necessary for operating the cafeterias.

2. No money may be expended for capital outlay except that which is transferred from the General Fund for a specific purpose by governing board resolution.

3. Meals for needy pupils are paid from the Cafeteria Fund/Account and are reimbursed by the General Fund by transfer. An exception is made when donations are made directly to the Cafeteria Fund/Account for this purpose.

Steps in Budgeting

The following steps should be followed in budgeting for a Cafeteria Fund/Account:

Beginning balances. Cash in the Cafeteria Fund/Account, cash collections awaiting deposit, accounts receivable, and stores and prepaid expense should be included in the beginning balance. Current liabilities must be included in the beginning balance and must be limited to obligations for services already performed or to materials and supplies received on or before June 30. If a cash reserve for the replacement of equipment has been maintained, debit balances should equal the credit balance of the accumulative equipment replacement reserve.

Income. Revenue is derived from cafeteria sales, Federal subventions, donations and General Fund special taxes raised to provide free meals for needy pupils.

The following should be considered when anticipating revenue for the cafeteria:

1. Past attendance and participation patterns.

2. The amount of cash income that will accrue from the sale of meals to eligible adults.

3. Billings to the General Fund for free meals.

4. Federal subventions, including (a) specified amounts of money provided for meals that meet given standards; (b) total meal reimbursement for free meals, and (c) the value of certain food items that are secured by paying only the cost of transportation. (Donations may accrue from local parent-teacher organizations or from other local groups. These donations are frequently earmarked for meals for needy students.)

If an estimate of total income from sales, Federal subventions, and donations is less than a reasonable estimate of proposed expenditures, a balanced budget may be achieved as follows:

1. By charging against the General Fund a portion of estimated expenses (other than for food). This action would be taken only by a board resolution and would be budgeted under Class 4700 – Food Services.

*2. By transferring sufficient funds from the General Fund to the Cafeteria Fund/Account to meet the deficit. Again, this action must be taken by a board resolution specifying the items exclusive of food for which the transfer is to be spent. This permits all cafeteria expenses to be paid from the Cafeteria Fund/Account. Unused balances of such transfers must revert to the General Fund.

Expenditures. Expenditures from the Cafeteria Fund/Account include those required for the following purposes:

1. Salaries – All of the above are charged to General Fund (Education Code 17102). The charges may be transferred to the Cafeteria Fund/Account later.

**2. Fixed Charges – These may include such items as contributions to the district-paid health and welfare programs, employee retirement funds and insurance charges.

3. Groceries – All food must be purchased by the Cafeteria Fund/Account. No General Fund monies may be used for this purpose.

4. Operating Supplies and Expenses – Such items as utilities, laundry and fuel are included here.

5. Repairs and Replacement of Equipment – Repairs to existing equipment and replacement of equipment with equipment of approximately equal value are allowable as cafeteria expenses.

6. Other Food Services – This includes costs for groceries and services to provide supplementary food service other than regular meals as, for example, snack bars.

7. Capital Outlay – Central kitchen equipment may not be charged against capital outlay of the Cafeteria Fund/Account for the original purchase and should therefore be charged to the General Fund.

Ending balance. The ending balance includes all cash in the County Treasury for the Cafeteria Fund or the cash in a bank or banks for the Cafeteria Account, cash collections awaiting deposit, accounts receivable, stores and prepaid expense. Current liabilities and the accumulative equipment replacement reserve must be deducted to arrive at a net ending balance.

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* Education Code 17201

** These benefits may be paid by the General Fund. This promotes the philosophy that the cafeteria is a needed instructional support function.

CHILD DEVELOPMENT FUND

Authorization

Education Code Section 16749 authorizes the establishment of a fund known as the Child Development Fund into which are deposited all funds received by the district for or from the operation of services under the Child Development Act of 1972.

Revenue Sources

Receipts deposited in the Child Development Fund in the County Treasury have the following sources:

1. Apportionments of Federal funds (Education Code Section 16781).
2. Apportionments of State Funds (Education Code Section 16780).
3. Fees from parents.
4. Income from a tax levied by the Board of Supervisors to raise an amount included in the budget of the district's governing board for child developmental services. This tax was not affected by the SB 90 tax reform of 1973 (Education Code Section 16750).
5. Transfers from the General Fund (Education Code 17201).

Budgeting – Apportionments

Under policies in effect in 1973-74, apportionments are made on the basis of child attendance hours that are "Federally eligible" or "non-Federally eligible."

"Federally eligible hours" of attendance are those hours of attendance at childrens' centers by children who meet certain economic criteria set forth in administrative regulations of the Federal Department of Health, Education and Welfare under portions of the Social Security Act. For these hours an apportionment, which may vary in amount per attendance hour – depending on the extent of available funds, is given from a combination of State and Federal funds. Fees collected from parents are deducted from the apportionment.

"Non-Federally eligible hours" are hours of attendance by children meeting State economic criteria, but not qualifying for Federal financial contributions. These hours are reimbursed to districts by a combination of apportionments and parents' fees.

There are also "full cost" hours for which parental fees must be collected in an amount totaling the estimated actual hourly cost of the child center operations.

Apportionments are remitted monthly to the County Treasury for the account of the district, based on an allotment of attendance hours. The monthly apportionments are about 80% of the anticipated total apportionment. Any balance due after year-end reports of total attendance hours and fees collected is paid in the early months of the following fiscal year.

In determination of "costs" for the purpose of claiming maximum apportionment allowances, retirement costs are allowed, including both district and state contributions, as well as a pro rata share of district overhead. Capital outlay costs are generally not allowed.

Budgeting – Expenditures

General. All costs incurred in the maintenance and operation of child development services are paid from the Child Development Fund, *except* contributions paid by the district to a retirement system covering employees providing these services. Such contributions are required to be paid from the General Fund (Education Code Section 16749).

Governing boards are permitted to use and furnish maintenance for buildings, grounds and equipment, and to use existing administrative personnel for child development programs (Education Code Section 16743).

Restrictions. In budgeting expenditures to be covered by the anticipated revenue to be deposited in the Child Development Fund from the sources listed, one restriction must be borne in mind:

> "No other funds of a district derived from the receipt of district taxes or derived from monies apportioned to the district for the support of schools thereof, except State monies appropriated for the support of child development services, fees and Federal funds, may be expended for or in connection with child development services" (Education Code Section 16749).

This means that General fund transfers are available for Child Development Fund deposits only to the extent necessary to cover contributions to employee retirement systems.

The budget format for the Child Development Fund used in the Form J-41 is essentially the same as that for the General Fund.

DEVELOPMENT CENTER FOR HANDICAPPED PUPILS FUND

A school district governing board is authorized by law to establish in the County Treasury a Development Center for Handicapped Pupils Fund (Education Code Section 6880.20) to support a development center for handicapped pupils. The purpose of such a center is to provide educational opportunities for physically handicapped and mentally retarded pupils ages three to twenty-one for whom no other school program has been authorized by the Education Code (Education Code Section 6880).

The Development Center is supported by the State on the basis of child-hours of attendance (Education Code Section 6880.14). The Superintendent of Public Instruction apportions the State funds to the districts or to the county superintendents of schools. Income and expenditures are recorded to the Development Center for Handicapped Pupils Fund according to the classifications on budget form J-41B.

In addition to the State funds, a district or the county superintendent of schools maintaining a center may include in its budget an amount necessary to carry out the center's program. The tax levy necessary in such cases is in addition to any other school district tax authorized by law (Education Code Section 6880.16).

APPENDIX D

USER FEEDBACK SUMMARY

USER FEEDBACK SUMMARY

GRANT JOINT UNION HIGH SCHOOL DISTRICT

At Grant, the head of data processing is the main user of data processing. Therefore, it was not possible to obtain an objective user survey.

LOS RIOS COMMUNITY COLLEGE DISTRICT

We interviewed users at all three campuses and at the district office in obtaining the information contained in this section.

Satisfaction

In general, the users were extremely satisfied and felt that the data processing department understood their problems.

Suggestions

- Better turnaround time on student compiles*
- More flexibility – decentralize data entry

Current Needs

- Statistical analysis packages**
- More demographic data on students**
- Data base/data communications capability (DB/DC)
- Evaluation of graduation requirements
- Plant inventory
- Direct file transfer from feeder schools
- Employment information for students

* Suggested by half the users surveyed
** Near unanimous suggestion

Future Needs

- Remote Job Entry (RJE)
- Interactive programming
- Computer assisted instruction (CAI)*
- On-line data files (DB/DC)*
- On-line registration*
- On-line data entry
- Library catalog
- More research studies*

SACRAMENTO CITY UNIFIED SCHOOL DISTRICT

We surveyed users at elementary, junior and senior high schools as well as the district office.

Satisfaction

- Satisfied users
- Knew they were getting good service
- Not afraid to give constructive criticism

Suggestions

- Simplify input (optical scanning)
- Transcript evaluation
- Revise student record format (improve record in general)*
- Do some long-range planning (versus reacting) through Division of Instruction
- Turnaround time should be improved

* Suggested by half the users surveyed
** Near unanimous suggestion

- Better system for handling out-of-district transfers*
- Improve plant inventory
- Priorities: Business versus education**
- Policy decisions should be made by educators (not operations level people)

Current Needs

- Teach data processing**
- More programmer time (research analysis)*
- On-line guidance system
- Master schedule generator

Future Needs

- On-line data files (DB/DC)**
- Education service given higher priority (versus business)*
- On-line guidance system**
- CAI/CMI*
- Profile of dropout
- Pupil tracking system
- Early childhood education reports
- Attendance (e.g., Kennedy)**
- Special education indicator selection program
- Data base of teacher-made tests (CTSS)
- Library/textbook/equipment replacement program
- Criterion reference testing

* Suggested by half the users surveyed
** Near unanimous suggestion

SACRAMENTO COUNTY REGIONAL CENTER

We surveyed a sampling of user districts representing both large and small users, as well as users within the Sacramento County offices.

Satisfaction

- Budget – needs more summary documents
- Contract districts generally satisfied (some more progressive districts want more than can presently be provided)
- County office users – dissatisfaction with turnaround time and new developments

Suggestions

- More flexible report card comments (output in general)
- Simplify data preparation
- Improve turnaround time (both processing and development)

Current Needs

- Pupil census
- Personnel files
- Generalized information system (data base)
- Business package

Future Needs

- RJE/on-line (data entry)
- Evaluation/research related to testing
- Diagnosis and prescription
- Instruction (mathematics, science, business education)
- Career education/job placement system

SAN JUAN UNIFIED SCHOOL DISTRICT

We surveyed school sites and within the district office.

Satisfaction

- Ranges from satisfaction to apathy
- Large groups at each extreme – almost no middle group
- Group frustrated with data processing seemed to be the most creative and articulate

Suggestions

- Simplify attendance data preparation (optical scanning input)
- More communications → give more feedback**
- Full-time liaison to schools (certified)*
- Keep data current
- Business versus education – who owns computer*
- Regular interdistrict information exchange
- Budget printout – more current
- Systems analyst to analyze districtwide continuity of applications
- Better turnaround time**
- Adequate staffing*
- Grade reporting system needs revision – communication and simplification*
- Decision making group at higher level responsible to superintendent
- More leadership from data processing – should not be in a reactive mode
- Cost effectiveness study of applications*

* Suggested by half the users surveyed
** Near unanimous suggestion

- Staff seminar on how computer works and how it can help**
- More flexibility – more time available*
- 1001 in intermediate schools for schedules changes

Current Needs

- Computer literacy program
- Enrollment projections from feeder schools (incoming student lists)**
- Curriculum data bank
- Instructional use
- Test data bank
- Teacher-made testing – item analysis*
- Student tracking system
- Bus scheduling
- Individualized instruction
- Student directory (census)*
- GPA and class rank*
- Textbook inventory
- Master schedule builder*
- Plant inventory*
- Exception reporting – tested problems (special education candidates)
- Daily attendance (summary for grade cards) or monthly list**
- Simulation runs on registration*
- Cumulative record*
- Personnel**

* Suggested by half the users surveyed
** Near unanimous suggestion

Future Needs

- Computer assisted instruction (CAI)
- On-line student counseling system*
- Modular scheduling*
- Personnel (retirement warnings, T.B. X-ray, sick days, vacation)*
- Audio-visual scheduling
- Maintenance scheduling
- Reference library materials/educational resources*
- Student body accounting
- Survey service available to schools

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* Suggested by half the users surveyed

APPENDIX E

JOB DESCRIPTIONS

Appendix E

JOB DESCRIPTIONS

DIRECTOR

Plans, organizes and controls overall activity of EDP through managing subordinates or by direct supervision. Personally handles major personnel, administrative and data processing problems. Directs the development and maintenance of timeliness and quality standards for all aspects of the data processing operation. Determines and recommends department budgets and analyzes controllable expenditures. Plans and coordinates continuing evaluation of the effectiveness and economy of existing data processing applications and the feasibility and potential value of new applications. Is also responsible for maintaining in the organization an awareness of new development in information technology, computer hardware and software and for the formulation of long- and short-range plans for the acquisition and implementation of new equipment and techniques.

MANAGER, SYSTEMS ANALYSIS AND PROGRAMMING

Is responsible for all systems analysis and applications programming activity in the organization and may have subordinate supervisors in charge of these functions. Is responsible for the establishment of priorities and schedules for the development of data processing applications and for the development and maintenance of standards for systems analysis and programming. Participates in the evaluation of new computer hardware and software systems to determine feasibility of installation.

MANAGER, COMPUTER OPERATIONS

Plans, organizes and controls the operation of the computer and peripheral data processing equipment. In full charge of all activities of equipment operations. Works closely with scheduler to establish detailed schedules for the utilization of all equipment to obtain maximum usage. Assigns personnel to the various operations and instructs them where necessary so they are trained to perform assigned duties in accordance with established methods and reports to the manager of data processing on equipment operation efficiency.

SCHEDULER

Schedules the flow of jobs through the data processing system to attain maximum utilization of equipment and to assure timely delivery of computer output to customers. Responsible for keeping unassigned time and processing capacity to a minimum through coordination and liaison with cognizant personnel. Maintains a list of stand-by operations for assignment of unused time and reschedules jobs as problems occur. Coordinates preventive maintenance requirements with operating schedules. May audit machine utilization logs for completeness and accuracy and prepare machine utilization reports for cost analysis.

SYSTEMS PROGRAMMER

Under minimum supervision, uses a thorough knowledge of current software techniques and hardware capabilities to develop and modify software (as opposed to applications) programs of a high degree of complexity and scope and to provide technical support to applications programmers and to lower-level systems programmers. Is concerned with achieving the most efficient use of available hardware through effective use of software programs and routines. Studies available software and makes recommendations concerning purchase of software packages from vendors or development of in-house programs. May carry out or participate in feasibility studies for installation of new hardware or software systems and the implementation of such systems.

SYSTEMS ANALYST

Under general supervision, conducts studies of specific administrative, scientific or engineering functions to determine the applicability of electronic data processing or to improve existing applications. Identifies all aspects of the assigned problem and evaluates user requirements in terms of the capabilities of the available hardware and software. Develops flowcharts which outline the logical steps to be followed in solving the problem and prepares systems specifications, including input and output formats. May provide systems support to programmer who develops actual machine instructions.

SENIOR PROGRAMMER

Under minimum supervision, develops and modifies applications programs of a high degree of complexity and scope. Usually works at highest level of all technical phases of programming while working on his own most of the time. Analyzes problems outlined by systems analysts in terms of detailed equipment requirements and capabilities. Verifies program logic by preparing test data for trial runs. Tests and debugs programs. Prepares instruction sheets to guide computer operators during production runs. Evaluates and modifies existing programs to take into account changes in systems requirements or equipment configurations. May translate detailed language logic flowcharts into coded machine instructions. May assist in determining the causes of computer operation malfunctions. May confer with technical personnel in systems analysis and application planning. Not a supervisor or a permanent project leader.

PROGRAMMER

Under general supervision, maintains and modifies existing applications programs and writes new programs of moderate complexity and scope, working from basic systems designs and specifications and utilizing standard procedures and techniques. Prepares flowcharts, writes machine instructions and procedures for computer operators, debugs and documents programs. Under somewhat closer supervision, may assist higher level programmers in the development of programs of a more complex nature. Work assignments at this level are aimed more at production than at training, but work is still subject to regular check by supervisors.

PROGRAMMER TRAINEE

Under direct supervision, carries out work assignments designed to prepare him for promotion to the next level of applications programming. Receives formal training and on-the-job instruction in conjunction with a progression of increasingly more difficult work assignments involving the flowcharting, coding, debugging and documentation of applications programs. Ordinarily does not remain in this category more than 18 months, and frequently progresses to the next level considerably sooner, based on skills development.

SENIOR PROGRAMMER/ANALYST
PROGRAMMER/ANALYST

See descriptions for both (Senior) Programmer and Systems Analyst. This is an extremely important position as it carries complete responsibility from design through detail implementation and ongoing maintenance. Generally this position is used in heavily maintenance-oriented environments.

LIBRARIAN

Maintains library of files. Issues files to authorized personnel and maintains charge-out records. Classifies, catalogs and codes files in accordance with such information as content of data, type of routine, number of reels or packs, etc. Inspects returned reels/disks to determine replacement needs due to wear or damage. Stores files according to classification and catalog designation.

BURSTER, DECOLLATOR OPERATOR

Bursts and decollates computer processed output and prepares for shipment to users. Receives blank forms and other materials, stores them and maintains inventory control.

OPERATOR II (COMPUTER)

Under limited supervision, operates the console or the console together with the peripheral units of an electronic computer to accomplish the complete processing of programs containing multiple and complex processing sequences. Monitors processing operations, determining probable cause of any malfunction and taking corrective action on his own initiative where appropriate. Capable of assisting programmers in testing and debugging of new experimental programs. Acts as shift supervisor, but is *not* an exempt supervisor. May maintain machine operating records.

OPERATOR I (COMPUTER)

Under general supervision, operates computer and peripheral equipment to test and run routine scheduled programs. Makes adjustments to machines using programmers' instructions, flowcharts, and manufacturer's control procedures. Manually keys in prescribed code and/or data changes. Observes operation of computer and enslaved components and corrects readily recognizable functional discrepancies. Seeks assistance of senior operating personnel or supervisor if unable to correct errors.

DATA CONTROL MANAGER

Supervises employees who receive source documents for data input from various departments, maintains control records on this material, and checks the accuracy and appropriateness of both input and output data by visual examination and/or balancing to control figures. Is responsible for scheduling work of the control section to meet computer operations schedules. Coordinates closely with user departments and with computer operations and/or scheduling personnel to insure maintenance of schedules and satisfactory condition of data input and output. This is a first level exempt supervisory classification.

DATA CONTROL CLERK

Receives source material, documents or other input for data processing from various departments in the organization. Maintains control records for this input prior to converting to machine readable input and for subsequent computer output of reports or listings. Reconciles and balances reports to controls set up for checking output, correcting errors and adjusting control figures as needed. Must be able to operate an adding machine and calculator as part of work.

KEYPUNCH SUPERVISOR

Supervises and directs the work of employees who operate data entry devices to transcribe data from source documents into a form suitable for data processing. Plans and schedules data entry and verification jobs. Maintains and updates files related to data entry jobs and assists in determining more efficient data entry procedures. This is an exempt supervisory position.

KEYPUNCH OPERATOR II

Under general supervision, operates a keypunch, key-to-tape, or key-to-disk device to transcribe alphabetic and/or numeric data from source documents into a form suitable for data processing. Handles complex or nonstandard jobs for which source documents may require considerable concentration and some judgment to obtain correct sequence of data. May perform such tasks as preparation of program cards for keypunch operation (to control automatic duplication, shipping, spacing, etc.). May also verify the work of other data entry operators.

KEYPUNCH OPERATOR I

Under close supervision, operates a keypunch, key-to-tape or key-to-disk device to transcribe alphabetic and/or numeric data from source documents into a form suitable for data processing. Handles routine jobs only, for which clear instructions and standard, clear input documents are provided. Usually will not be responsible for such tasks as preparation of program cards for keypunch operation. May verify the work of other data entry operators.

SECRETARY TO DIRECTOR

Has good overview of the general operations of data center and is able to direct inquiries to their proper sources. Is familiar with data control procedures and can act in that capacity should the circumstances warrant. Is familiar with all the users of the center and has good personable relationship with them. Highly capable typist and stenographer. Well-organized, has good bookkeeping skills and picks up new ideas quickly.

EDUCATIONAL CONSULTANT

May be a certified position. Familiar with pupil personnel and educational applications. Acts as consultant and coordinator to individual schools in helping them understand the various applications available and encourages expanded utilization. In many ways the success or failure of an entire operation will hinge on this person's relationship with users. He is the focal point for user contact. Consultant may perform general systems design work.

APPENDIX F

IMPLEMENTATION

IMPLEMENTATION

APPROACH

Our experience in designing and implementing data processing systems has indicated that a phased approach assures a successful implementation. The phases divide the study into manageable units, providing milestones to measure the progress of the implementation. They also provide points for reevaluation and approval before proceeding to the next step. Implementations of the various alternatives are composed of modular segments of the four phases which follow. Individual implementation charts accompany each alternative.

1. Hardware procurement
2. General systems design
3. Detail systems design
4. Implementation.

HARDWARE PROCUREMENT

This first phase is the basis upon which any form of consolidation is built, whether the applications are to be run as separate independent approaches (Alternative No. 4) or are to all be merged into common systems (Alternative No. 2). It is the hardware decisions that are made in this phase that will decide the overall scope of effort necessary to convert systems to be able to share central hardware facilities. If there are to be common systems, the decisions made here will determine the overall development costs due to different application "packages" and high level languages available on various brands of computers.

The end product of this phase is the completion of Alternative Nos. 3, 4 and 5 (which vary by staff organization). Each agency's separate applications will have a capability to run on a central computer, or they will have repaced some of their applications with vendor supplied packages which may be modified to each agency's individual needs.

GENERAL SYSTEMS DESIGN

The concepts of the general system are developed in this phase. The interrelationships of each module are identified along with the information that management deems necessary, and the constraints and policies under which the system must operate. Each module will be designed to permit implementation independent of the development of other modules.

It is in this phase that the implementation plan is developed. This plan will assign priorities for the development of each module and will specify which modules will initially be computerized and which will initially be manually processed.

DETAIL SYSTEMS DESIGN

In this phase the general design is divided into its smallest parts to determine key processing requirements. These requirements involve the number and name of files, the structure of the files and the record layouts. The interaction of files is examined and the internal (computer) requirements for processing data is developed. As implementation occurs and resources become available, additional modules will be designed and implemented in a priority sequence defined in Phase I. It is important to note that even though this phase is primarily data processing oriented, it is anticipated that documentation of a manual module will occur concurrent with the detailed design of the automated module.

IMPLEMENTATION

In this phase the programs and operating procedures for computerized modules are prepared. The programs are tested and debugged, and training sessions are held to familiarize personnel with the system.

Upon completion of the implementation of each module, it will be determined which additional module(s) should be next. Programs will be written and tested and the procedures for the manual implementation will be modified as necessary. This process will continue until all modules have been fully implemented.

PHASE I. CENTRAL HARDWARE (2 years 5 months)

Task	1.	Choose alternative	1 month	
	2.	Review needs	2 months	
	3.	Write hardware/software RFP responses	2 months)	concurrent
	4.	Prepare bench mark	2 months)	
	5.	Issue RFP	1 month	
	6.	Issue bench mark	1.5 months	
	7.	Evaluate bench mark/RFP response	1 month	
	8.	Order hardware/software	1 week	
	9.	Contract conversion	16 months)	overlap
	10.	Train staff	13 months)	
	11.	Install hardware/software	2 months	
	12.	Evaluate progress and direction	1 month	

PHASE II. GENERAL SYSTEMS DESIGN (4 months)

Task	1.	Required information flow	1 month
	2.	Comparison of requirements	2 weeks
	3.	Analysis of application	2 weeks
	4.	Adaptation of existing design	2 weeks
	5.	Review available software	2 weeks
	6.	Implementation plan	2 weeks
	7.	Management approval	2 weeks

PHASE III. DETAIL DESIGN (11.5 months)

Task	1.	Develop processing system flowchart	1.5 months
	2.	Define file requirements	3 months
	3.	Determine equipment needs	2 weeks
	4.	Refine implementation schedule	1 month
	5.	Develop program specifications	4 months
	6.	System test plan	1 month
	7.	Conversion plan	2 weeks

PHASE IV. SYSTEM IMPLEMENTATION (10.5 months)

Task	1.	Program development	3 months
	2.	Develop control and clerical procedures	1 month
	3.	System test	2 months
	4.	User training	1.5 months
	5.	Conversion	2 months
	6.	Final acceptance	1 month
		Total	26 months

INDEPENDENT MODULES

Train staff	13 months
Evaluate progress and direction	2 months
Install hardware	2 months

WORK PLAN

The following paragraphs outline each phase and the work to be performed in each task (see Figures F1 and F2).

Phase I – Central Hardware

Task One – Select Alternative

The first major task is gaining agreement to commit to an alternative. Once one course of direction has been approved, the plan can move forward. The one month time frame set for this task is the length of time estimated to gain approval from the Boards of the agencies involved. However, before this task begins, the Electronic Data Processing Steering Committee must make a *specific* recommendation to be carried back to the Boards.

Task Two – Review Needs

The long-range EDP goals of the agencies were established in meetings held in August 1974. The agencies should now be given an opportunity to review those long-range plans in relation to the direction chosen in Task One and gain Board approval of those plans.

Task Three – Prepare Hardware/Software RFP

Reviewing Task Two and the hardware recommendations in the Report to Electronic Data Processing Steering Committee should result in a general hardware design. Extensive review of the state of the art in data processing in both hardware and software (both systems and application) will lead to detailed hardware and software specifications which will appear in the RFP. Vendors should be contacted and given a chance to present seminars prior to the writing of the RFP. Conversion aids are a key consideration.

An alternate approach to writing an RFP is to issue a statement of the existing problems and the approximate financial constraints, allowing each vendor to design his own approach based on that vendor's strengths and perceptions.

Weighting criteria should be developed and distributed with the RFP. A statement of allowance for subjective factors (intangibles) should be included with the weighting criteria.

Task Four – Prepare Bench Mark

A bench mark should contain a representative sampling of existing programs, conversion tasks, application packages, future capabilities, and exercises of system software capabilities. Each agency should be given an opportunity to express the primary concerns which it wishes to have represented as a part of the bench mark.

Dates for each bench mark should be scheduled before the bench marks are issued. The bench mark material is then distributed on a staggered schedule corresponding to the date upon which each vendor is scheduled. This will provide all participating vendors with an equal amount of time. Weighting factors should be developed and distributed with the preliminary material requesting schedule dates. Delays of bench marks should count as negative weighting factors. Vendors are to submit sworn statements of total man-effort involved in bench mark preparation (listed by task).

Task Five – Issue RFP

Task Six – Issue Bench Mark

All qualified vendors are issued RFP's, and bench mark material is distributed as suggested in Task Four. A bidder's conference is held one week from the date of RFP issuance. Specific time periods or personnel should be set up to answer questions pertaining to bench mark materials.

Task Seven – Evaluate Bench Mark/RFP Responses

The bids and bench mark results are weighed based on the criteria distributed to all participating vendors. Agency representatives are given an opportunity to submit their subjective opinions and request a specific weight be attached to each. Once all the factors have been submitted, they will be evaluated based on weights by the entity (multiagency committee or independent consultant) empowered to prepare a final recommendation.

Task Eight – Order Hardware/Software

Based on recommendations from Task Seven, hardware and software is placed on order. A separate contract must be signed for conversion of all programs that will not run intact (or with *minor* modification) on the new equipment or be replaced by new packaged software. The conversion may be performed by the hardware vendor or an independent responsible software firm.

(Note: If common applications, go to Phase II, Task One)

Task Nine – Contract Conversion

Outside assistance will be contracted for a straight conversion of existing programs to run on the centralized computer. The actual cost and length of time necessary is dependent upon the choice of hardware and the conversion aids available from the vendor. Agency staff will provide limited help in the conversion as a part of their training exercises.

Task Ten – Train Staff

This includes operator training, system software, application packages, vendor supplied ANS compilers, and training in project management and structured programming. Most of the existing staffs are proficient in COBOL. The amount of time necessary to provide a high level of competence in ANS COBOL and efficient use of vendor extensions will depend on available training capability of the vendor or outside education facility and the degree of similarity between existing knowledge and necessary knowledge for the selected system.

Task Eleven – Install Hardware/Software

Installation includes acceptance tests specified by the agencies (usually a repeat of the bench mark), tests of system software, and all application packages being installed as well as the obvious hardware tests. The first two months will provide for parallel operation (agencies will continue to run on their own machines, and checking the results of the central computer runs).

Task Twelve – Evaluate Progress and Direction

Three months after installation of hardware and software is completed, and the central computer has been running the *full* load of all participating agencies, a one-month evaluation should be performed to reevaluate the validity of the long-range plans (which were last formally reviewed over two years ago). The users should be surveyed for satisfaction with central computer reports. Based on satisfaction with central services and the revised view of long-range goals, Phase II should commence.

Phase II – General Design

Task One – Required Informational Flow

Interview supervisors and key personnel of all related functions, to determine operating procedures and information requirements. In addition, discuss information requirements with key management. As part of this task, the constraints and policies under which the system must operate will be ascertained. These could include:

- Speed in reporting
- Data collection techniques
- User requirement
- Legal or district restrictions related to information that can be collected or information that can be provided.

In addition, review in depth numbering systems to determine the consistency of format. This analysis will help to minimize the problems of common systems.

Task Two – Comparison of Requirements

In this task the information collected in Task One will be compared to operations and information requirements with previously designed systems.

As differences are identified, meetings will be held with appropriate management to resolve the inconsistencies. Results of these meetings will provide the input for future tasks.

Task Three – Analysis of Application

To develop rules that will properly produce useful data that can be readily available in a variety of formats, it is necessary to understand the relationship that each data element has with respect to the entire system.

Task Four – Adaptation of Existing Design

Based on findings in the previous tasks, modification of the existing system and development of those modules and subsystems necessary to support the integrated systems will be developed.

Task Five – Review Available Software

The primary objective of this task is to review existing software to determine applicability to the new systems. Evaluate systems purchased or leased and other packages available from vendors. As a result, it may be possible to accelerate implementation by adapting existing software to the design. In reviewing these systems, consider the following criteria:

- Demonstrated operational status
- Economy of operation
- Compatability with your data processing capability
- Practicality considering desired capabilities
- Compliance with system requirements.

Task Six – Implementation Plan

In this task the priority of implementation, the timetable and responsibilities relative to implementing each module must be determined. This plan will indicate the time phasing of such major tasks as:

- Develop processing flowcharts
- Define file requirements

- Detail design
- Program development
- Develop procedures
- System test
- Training
- Conversion.

In addition, personnel resources (numbers and classifications) required for Phase II and III must be determined.

Task Seven – Management Approval

In this task, the general design will be presented in its entirety to management. In addition to an oral presentation, documentation will include:

- Generalized flowcharts of each module
- Complete narrative describing each module
- Recommended inventory management rules
- Sample inputs
- Sample output reports
- Implementation plan.

Phase III – Detail Design

Task One – Develop Processing System Flowchart

A detailed system flowchart will be developed depicting the flow of information through the data processing system. Included will be:

- Computer files (transaction, master, intermediate)
- Processing and utility programs.

Each flowchart will identify the specific inputs and output, developed in Phase I, required for processing. The system flowchart will be supported by a narrative description of the system, including functional descriptions of each program and any critical logic requirements.

Task Two – Define File Requirements

The next step in systems design is to define file requirements by logically grouping data elements into specific master files. Besides analyzing a multifile concept, explore the feasibility of utilizing an integrated data base. This concept has proven advantageous on similar projects because as new modules are integrated with existing systems it is often easier to program and modify an integrated data base. A detailed description of master files will include the following:

- File organization and sequence
- Data element names and sizes
- Documents which provide the information required in each file
- Output reports where element appears or is needed.

A controls document will also be produced describing five key elements of control that are considered in system design:

- Input controls
- Reject (error) controls
- Overall file balancing
- Audit trail capability
- Recovery and restart approaches.

Task Three – Determine Additional Needs

The computer hardware configuration will be a major consideration in the detail design efforts. However, an analysis of processing volumes and flow may indicate the need for additional or reduced storage and/or processing capacity.

Task Four – Refine Implementation Schedule

Once the system design is completed, the next step in the project will be to refine the implementation schedule developed in Phase I. To ensure a smooth implementation effort, the schedule will include the following features:

- Detailed work steps
- Starting and completion dates
- Manpower and control features.

At this point it is imperative to determine the priority of implementation, the availability of resources and the scope of the effort. Periodic review points at the completion of major milestones will be incorporated within the plan.

Task Five – Develop Program Specifications

In this task, the system design is converted to computer specifications and manual procedures and readied for programming and implementation. The procedure for modules that will be manual may require modification when the module is automated. The preparation of these manual procedures will be determined by the conversion timetable.

After the data base files are finalized, individual program write-ups are prepared. These specifications are prepared for each program of the system and will include:

- The program name
- A program abstract
- A narrative description of the program logic
- A block diagram of complicated logic routines
- A description of input and output.

Task Six – System Test Plan

Further refinement of the implementation plan is accomplished by developing a detailed system test plan. The test plan will include the following elements:

- Scope and objectives of the test
- How and when it is to be conducted
- Types of conditions to be tested
- Test data to be used
- Output verification methods
- Computer time estimates
- Personnel requirements
- Control schedule.

The system test will simulate as closely as possible actual operating conditions and will test all conditions and exceptions.

Task Seven – Conversion Plan

A conversion plan will be created which will detail a realistic schedule of events necessary to convert from the current operating environment to the new system. The plan will include the following:

- Detailed steps of conversion activity
- Starting and completion dates
- Personnel requirements
- Critical paths
- Plans for training both user and data processing personnel.

At this time, it is possible to again refine the detailed design work plan, developed in Phase I, for subsequent modules of the total system.

Phase IV – System Implementation

Task One – Program Development

The major activity of this task is the coding and testing of each individual program of the system. Emphasize the use of structured programming techniques to reduce the time required to produce code, debug, and to maintain programs.

Immediately after programming efforts are completed, it will be the responsibility of each programmer to develop test data for his programs. Each program will be tested and debugged to a level considered acceptable before a complete system test effort begins.

Task Two – Develop Control and Clerical Procedures

Simultaneously with the programming efforts, the clerical and control procedures necessary to ensure accurate systems operations are documented. A user's manual will be developed and written in a manner specifically geared to the operating level of individuals performing the functions.

The types of information included in the manual will be as follows:

- Source document preparation procedures
- Data entry instructions

- Output report distribution procedures
- Error correction and reentry procedures
- Control and balancing procedures (input, run-to-run, files, output).

The clerical and control procedure documentation will be reviewed by management and appropriate user staff prior to preparation of final manuals.

Task Three – System Test

The test strategy developed during Phase II will be implemented for a final system test prior to conversion. All input, files, output and associated processing will be tested under conditions and with data similar to actual operations.

In evaluating the test results, established control procedures will be used so that adequacy of the systems and procedures can be determined. Any changes to the design programs or procedures will be reviewed, approved and documented.

Task Four – User Training

Simultaneously with computer system testing, clerical, shop, management, and data processing personnel will be trained. Training material will be prepared and appropriate seminars will be scheduled. It is necessary that all training be completed prior to conversion efforts.

Task Five – Conversion

This task represents the culmination of efforts of the entire project. The conversion plan developed as part of Phase II will guide the new system to actual operation.

It is anticipated that one module will be implemented at a time. Parallel operations will be maintained until the system is fully operational under fully loaded conditions. Frequent progress meetings will be maintained to monitor the system during this crucial conversion activity.

Task Six – Final Acceptance

Final acceptance of the system requires an objective review and analysis of operations which begins the day the first output is produced in a live environment.

An evaluation will take place as the system is observed in operation and would include the following evaluation factors:

- Reliability and timely operation of computer programs
- Reasonable level of rejects

- Balance and control of master files
- Proper use of output.

Acceptance criteria are to be developed which will significantly aid the acceptance process to ensure that the system objectives are being realized.

Task Seven – Evaluate Progress and Direction

Three months after common applications have been running on a central installation, a two-month evaluation should be performed to evaluate whether the implementation of common systems achieved the objectives set over two years ago. The long-range plans should also be reviewed to determine if they are still valid at this time or whether they require modification.

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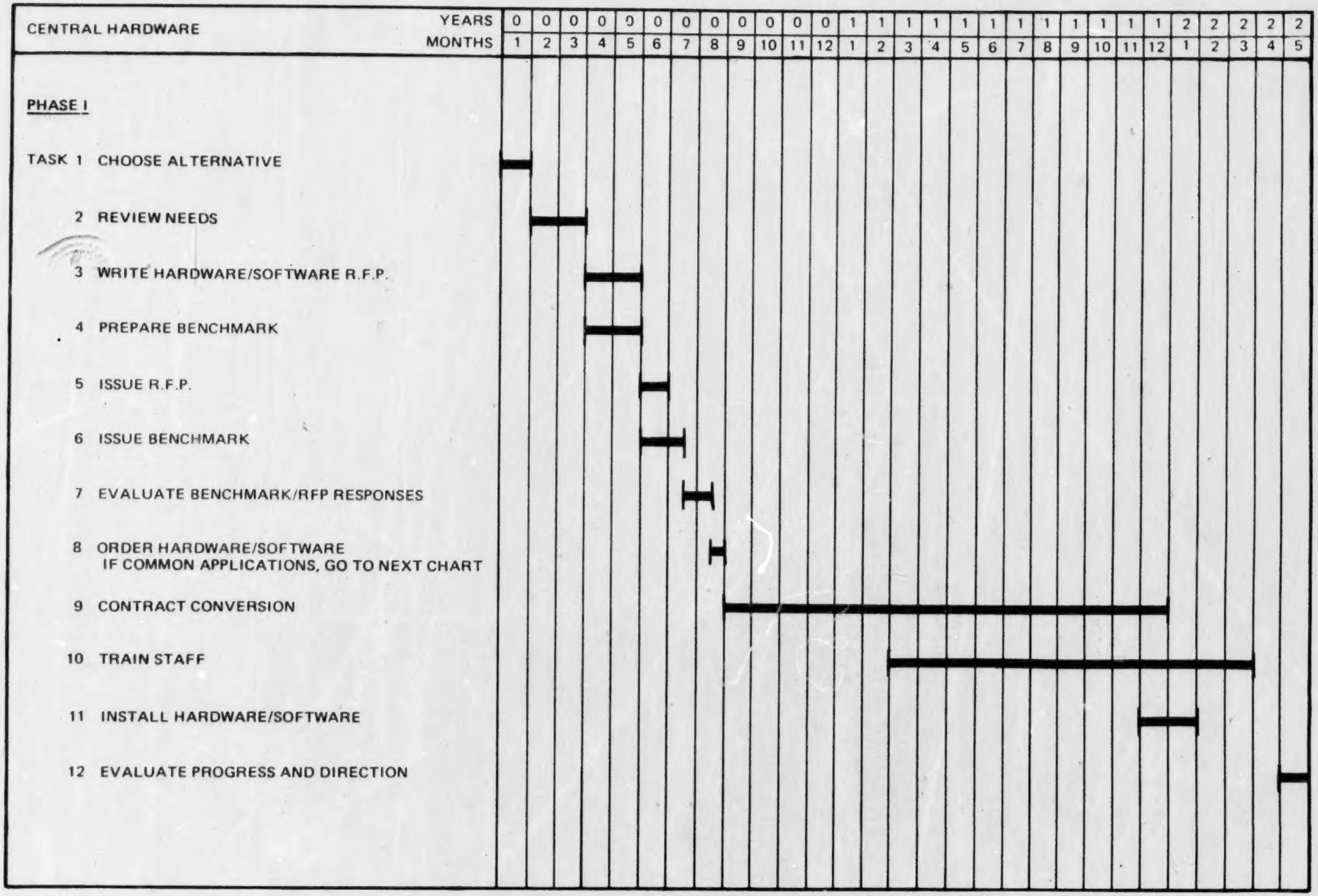
APPENDIX F
FIGURE F1

IMPLEMENTATION



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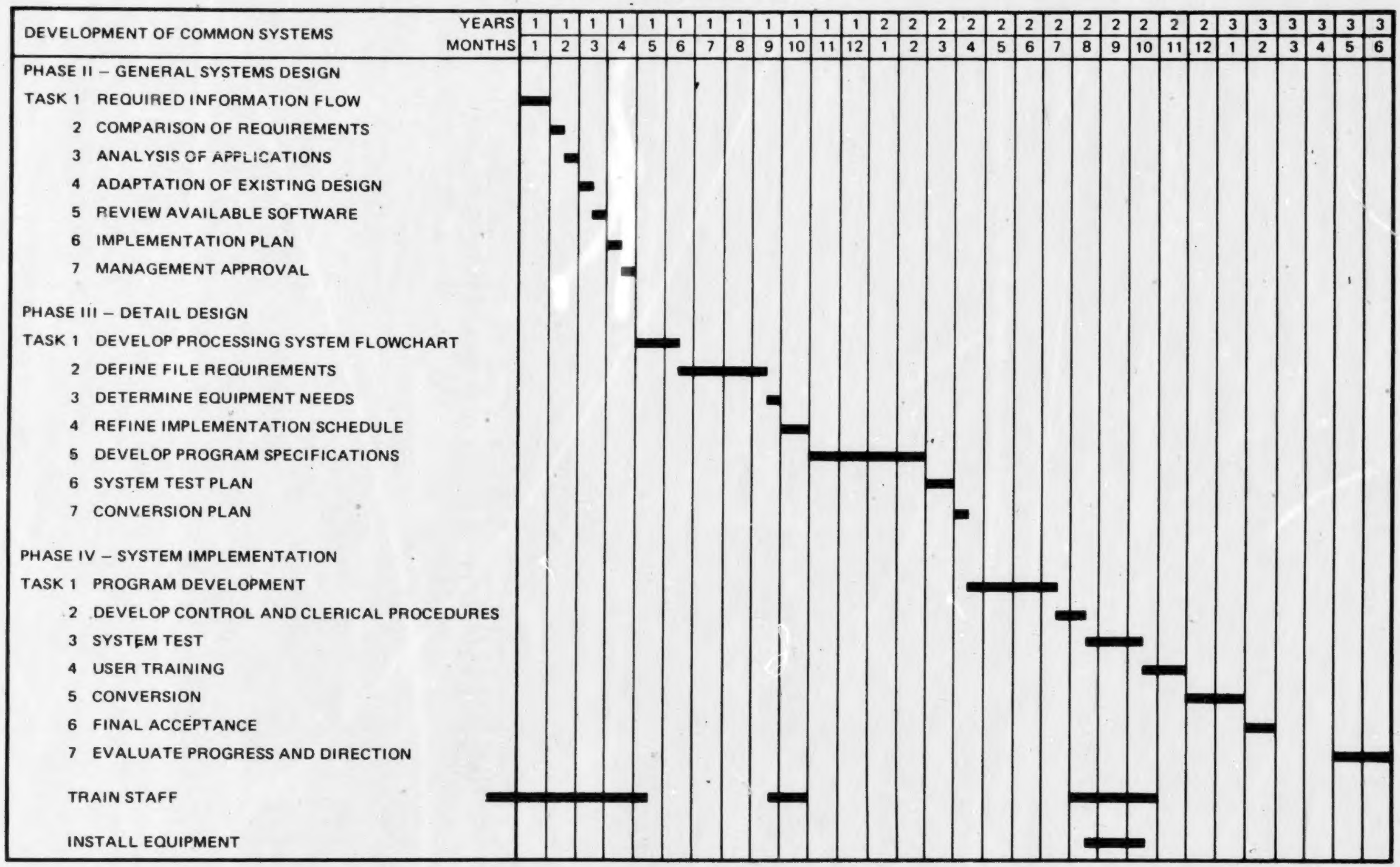
IMPLEMENTATION



APPENDIX G

FACILITY LOCATION

FACILITY LOCATION

To encourage equal participation in a central data processing facility, we recommend that the facility location be a neutral site located centrally to all agencies. An exception would be if an agency can *donate* a site (e.g., San Juan has an empty facility located centrally – Wyda Way School) or if an agency can provide a strong financial incentive for using its site (e.g., if the County Board of Education can provide a substantial supplement to the central data center budget through levying a Countywide tax) or if a community college district receives a larger educational discount than an elementary/secondary district. It would appear that the area bordering Cal Expo (near Arden Way and Howe) is the central location. It is less than five miles from the administrative offices and presently existing data processing facilities of all five agencies.

Many sites are available in the recommended area. The average cost, assuming a monthly lease, is $0.55 per square foot. The amount of space required varies from 5,500 square feet for Alternative No. 4 to 8,300 square feet for Alternative No. 3. Annual costs would vary from $36,300 to $54,780. These space estimates also provide office space for all central staff.

Alternative No. 2	8,000 square feet	$ 52,800 per year
Alternative No. 3	8,300 square feet	$ 54,780 per year
Alternative No. 4	5,500 square feet	$ 36,300 per year
Alternative No. 5	7,600 square feet	$ 50,160 per year
Alternative No. 6	7,200 square feet	$ 47,520 per year

APPENDIX H

ORGANIZATION AND ADMINISTRATION OF A CENTRALIZED DATA CENTER

ORGANIZATION AND ADMINISTRATION OF A CENTRALIZED DATA CENTER

The steering committee and technical committee described in the following paragraphs are meant to provide for user participation in the organizing and administering of a consolidated data center. (This applies to Alternative Nos. 2 through 6.) Alternative No. 1 is to be administered independently by each agency.

During the initial setup of the central center, these committees may have to meet almost on a daily basis. Once the center is functioning under a regular routine, the steering committee would meet monthly and for special emergencies. The technical committee would meet on a weekly basis. The decentralized staff would meet with the data center staff on an "as needed" basis to be decided by the data center director.

STEERING COMMITTEE

The central data center is administered by a director who reports to and is an ex officio member of the steering committee (similar to a superintendent's relationship with his Board of Education). The committee is composed of one high level administrator (at least assistant superintendent or college president) representing each agency. The County Regional Center could have a nonvoting member representing its user committee. Los Rios could have all its college presidents attend as nonvoting members.

This committee sets policy, resolves conflicts between users, sets costing allocation, and provides advice for the director. All hardware, staffing and other changes that could have major impact on the services provided by the center must be approved by this committee. Priorities are set and/or approved by the steering committee.

TECHNICAL COMMITTEE

The major task of cooperation and coordination between agencies and the center on an operational level is accomplished by the technical committee. This committee is composed of agency coordinators, one educational consultant (from those agencies supporting a full-time certified position) and one representative from the colleges who will regularly meet with the data center director, operations manager, manager of systems and programming, and/or systems analysts (if appropriate) to resolve operational problems and set priorities. This committee will meet (with users) to develop criteria for common applications and recommend priorities for their development to be approved by the steering committee.

The technical committee makes recommendations to the steering committee for hardware, staffing, and policy changes. User requests enter the system through this committee which must assign a priority to each request.

DECENTRALIZED STAFF

The following personnel would have regular meetings with representatives of the central data center in order to answer questions, resolve conflicts, and ensure common standards:

- Keypunch supervisors
- Data control supervisors
- RJE operators
- Mini operators
- Mini programmers

In any consolidated environment, the priorities would initially be suggested by the technical committee, but subject to final approval by the steering committee. Priorities will be set in two major areas:

1. Hardware utilization
2. Application development and maintenance.

On the hardware operations level, the steering committee may set policy such as: payroll always has a higher priority than research, report cards always have priority over personnel file updates, standardized testing has priority over teacher-made testing. This type of policy must be set by the representatives of individual agency administrations (steering committee) so that the director and staff of the consolidated center are not accused of setting policy or "playing favorites." The scheduler and the operations manager will be charged with implementing the operational priorities. This method is applicable in all alternatives with consolidated hardware (Alternative Nos. 2 through 6). In Alternative No. 1, each agency sets its own priorities.

Alternative Nos. 1, 3, 4 and 5 have each agency with its separate applications. In those cases, each agency will set its own priorities (within the capabilities and policy restraints of the central data center, not applicable to Alternative No. 1).

Alternative Nos. 2 and 6 have common applications. The major priorities should be set by the steering committee, while operational priorities will be set by the technical committee meeting with the users and the systems analysts. In Alternative No. 6, the committees will have to decide which applications are to be common, and when an individual application is to be converted to a common application (and visa versa, if applicable).

At regular intervals, user surveys would be taken to ensure satisfaction with service and check to see that priorities are effective as well as practical.

APPENDIX I

COST ALLOCATION

COST ALLOCATION

For all of the alternatives, 100% of the cost must be allocated to the users (unless a Countywide tax or special legislation will provide additional funds). Therefore, cost allocation will be computed on a percentage basis (instead of fixed hourly rates which may not equal 100% of the costs).

Certain functions are decentralized and their costs will be paid by each agency at the agency level. These personnel are employees of the agency, not the central data center: data entry staff, data processing coordinators, educational consultants, Remote Job Entry station operators, minicomputer operators and minicomputer programmers. When RJE stations or minicomputers are used, data control becomes an agency function (as opposed to a central data center function under batch environments).

ALTERNATIVE NO. 1

All costs are paid by each agency as all activities are decentralized.

ALTERNATIVE NO. 2

The total cost (hardware, operations staff, programming staff, overhead, etc.) is allocated to each agency based on the number of available applications used by that agency and the percentage of the total time that application requires in relation to each agency. The allocation will be based on operating system job accounting routines. Fixed overhead cost will be allocated based on the average percentage figure for each agency's other billings.

ALTERNATIVE NO. 3

Due to separate applications, the systems and programming staff is organized by the agency serviced. Therefore, systems and programming cost will be distributed accordingly. Operations costs, hardware, and fixed overhead will be allocated based on percentage of equipment used. These figures are compiled by the operating system job accounting routines, plus clock time for dedicated devices (files on-line, disk drives, tape drives). It would be less expensive for Grant to be serviced by one of the other agencies than to be a fully participating member of the consolidated center.

ALTERNATIVE NO. 4

Systems and programming staff are decentralized and therefore are employees of individual agencies. The central data center costs are allocated (by percentage of total cost) based on job accounting routines plus clock time for on-line files, disks and tapes. It would be less expensive for Grant to be serviced by one of the other agencies than to be a fully participating member of the consolidated center.

ALTERNATIVE NO. 5

Staff for applications development is decentralized and are therefore employees of each agency. The application program maintenance staff is organized by the agency serviced. Therefore, the cost of the maintenance staff and its fixed overhead will be distributed accordingly. The central data center costs are allocated (by percentage of total cost) based on job accounting routines plus clock time for on-line files, disks and tapes. It would be less expensive for Grant to be serviced by one of the other agencies than to be a fully participating member of the consolidated center.

ALTERNATIVE NO. 6

The total costs of the computer center must first be divided between common applications and its support, and those applications run separately. The cost of the central systems and programming staff is totally allocated to the common applications which are, in turn, allocated to each agency based on the number of available common applications used by each agency. The costs of hardware, operations staff and fixed overhead for common systems are allocated to each agency based on the number of available common systems used by each agency and the percentage of time based on job accounting routines that relate to the needs of each agency.

The cost of separate applications (hardware, operations staff and fixed overhead) will be allocated based on percentage of equipment used. These figures are compiled by job accounting routines (in the operating system), plus clock time for dedicated devices (files on-line, disk drives, tape drives), plus the amount of operator intervention required (including tape and disk mounts and dismounts).

APPENDIX J

STAFFING

BEST COPY AVAILABLE

POSITIONS AVAILABLE UNDER CONSOLIDATION ALTERNATIVES

ALTERNATIVES	PRESENT	1	2	2 w/ RJE	2 w/ MINI	3	3 w/ RJE	3 w/ MINI	4	4 w/ RJE & MINI	5	5 w/ RJE	5 w/ MINI	6	6 w/ RJE	6 w/ MINI
D.P. MGR/DIRECTOR/ COORDINATOR	5½	5½	5½	5½	5½	5½	5½	5½	5½	5½	5½	5½	5½	5½	5½	5½
EDUCATIONAL CONSULTANT	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
SYSTEMS PROGRAMMER	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2
SYSTEMS ANALYST	3	4	4	4	4	5	5	5	4	4	2	2	2	5	5	5
MGR, SYSTEMS & (SUPV) PROGRAMMING	(2)	(2)	1	1	1	1	1	1	(2)	(2)	1	1	1	1	1	1
MGR, (SUPV) OPERATIONS	(3)	(3)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DATA BASE ADMINISTRATOR	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SR. PROG SR. PROG/ANALYST	8	10	4	4	4	5	5	5	9	9	11	11	11	9	9	9
PROG/ PROG/ANALYST	8	11	6	6	10	6	6	10	11	11	13	13	17	7	7	11
PROG TRAINEE	0	0	4	4	4	4	4	4	0	0	0	0	0	2	2	2
OPERATOR II	4	5	4	12½	12½	4	12½	12½	4	12½	4	12½	12½	4	12½	12½
OPERATOR	10	13	4	4	4	6	6	6	6	6	6	6	6	5	5	5
KEY PUNCH SUPV	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
KEY PUNCH OPERATOR	18	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DATA CONTROL MGR (SUPV)	(1)	(1)	1	(1)	(1)	1	(1)	(1)	1	(1)	1	(1)	(1)	1	(1)	(1)
DATA CONTROL CLERK	5½	7	5	7½	7½	5	7½	7½	5	7½	5	7½	7½	5	7½	7½
SCHEDULER	0	0	½	½	½	1	1	1	1	1	½	1	1	½	1	1
TEST ADMIN	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
LIBRARIAN	0	1	1½	1½	1½	1	1	1	1	1	1½	1	1	1½	1	1
BURSTER, DECOLLATOR OPERATOR	1	2	3	0	0	3	0	0	3	0	3	0	0	3	0	0
SEC/CLERICAL	3½	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTALS	78½	100½	77½	85½	89½	81½	89½	93½	86½	94½	87½	95½	99½	83½	91½	95½

SUMMARY OF STAFFING ② AND SALARY ① EXPENSES

	TOTAL STAFF	TOTAL PERSONNEL EXPENSE ①
ALTERNATIVE NO. 1	100 1/2	$1,827,700
ALTERNATIVE NO. 2	77 1/2	1,508,786
ALTERNATIVE NO. 2 WITH RJE	85 1/2	1,620,593
ALTERNATIVE NO. 2 WITH MINI	89 1/2	1,701,482
ALTERNATIVE NO. 3	81 1/2	1,597,346
ALTERNATIVE NO. 3 WITH RJE	89 1/2	1,709,153
ALTERNATIVE NO. 3 WITH MINI	93 1/2	1,790,042
ALTERNATIVE NO. 4	86 1/2	1,646,262
ALTERNATIVE NO. 4 WITH RJE OR MINI	94 1/2	1,758,071
ALTERNATIVE NO. 5	87 1/2	1,726,185
ALTERNATIVE NO. 5 WITH RJE	95 1/2	1,842,651
ALTERNATIVE NO. 5 WITH MINI	99 1/2	1,923,540
ALTERNATIVE NO. 6	83 1/2	1,651,479
ALTERNATIVE NO. 6 WITH RJE	91 1/2	1,767,944
ALTERNATIVE NO. 6 WITH MINI	95 1/2	1,848,833

① INCLUDES FRINGE BENEFITS BASED ON 1979 PROJECTION 5% PER YEAR SALARY INCREASE

② CENTRAL STAFF AND STAFF AT EACH CENTER

APPENDIX K

ESTIMATED 1979 AGENCY BUDGETS
ALTERNATIVE NO. 1

ESTIMATED 1979 AGENCY BUDGETS
ALTERNATIVE NO. 1

	Hardware*	Personnel	Total
Grant	$ 22,000	70,000	92,000
Los Rios	212,000	365,000	577,000
Sacramento City	64,000	395,000	459,000
Sacramento County	246,873	771,000	1,017,873
San Juan	96,000	227,000	323,000
			$ 2,468,873

* Includes supplies and overhead